A·I·B·S

bulletin

NEWS AND VIEWS IN THE BIOLOGICAL SCIENCES

Vol. V OCTOBER • 1955 No. 5

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UNIVERSITY OF MINNESOTA
AGRICULTURE
JUN 11 1956
INSTITUTE OF AGRICULTURE

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Across the Editor's Desk

• **Competition for approximately 1000 United States Government scholarships for graduate study abroad for 1956-57 is now open.** A brochure describing overseas study awards under the Fulbright Program and the Buenos Aires Convention Program may be obtained, with application blanks from: *Institute of International Education, 1 East 67th St., New York* or the offices of Fulbright advisers on college and university campuses. Countries where U.S. graduate students may study under the Fulbright Program are: Australia, Austria, Belgium and Luxembourg, Burma, Ceylon, Chile, Denmark, Finland, France, Germany, Greece, India, Italy, Japan, the Netherlands, New Zealand, Norway, the Philippines and the United Kingdom. Countries participating in the Buenos Aires Convention Program are: Bolivia, Brazil, Chile, Colombia, Costa Rica, Cuba, the Dominican Republic, Guatemala, Haiti, Honduras, Mexico, Nicaragua, Panama, Paraguay, Peru and Venezuela.

Eligibility requirements are: (1) U.S. Citizenship; (2) a college degree or its equivalent; (3) knowledge of the language of the country; (4) ages 35 years or under; and (6) good health. The awards cover transportation, expenses of a language refresher or orientations course abroad, tuition, books and maintenance for one academic year. *Competition for the 1956-57 academic year closes October 31, 1955.*

• **Graduate fellowships for study in Mexico during 1956** have been made available again to American students by the Mexican Government. The awards, which are given through the Mexico- United States Commission on Cultural Cooperation, have the following eligibility requirements: U.S. citizenship, knowledge of Spanish, a good academic record, a valid project or purpose, and good health. Fields of study especially recommended for graduate candidates are: architecture, Indian and physical anthropology, ethnology, archeology, museography, art, biological sciences, and Mexican history. Applicants may write for information to the *U.S. Student Department of the Institute of International Education, 1 East 67th St., New York. Closing date for application is November 1, 1955.*

• **The Fifth Session of the General Assembly of the International Union for the Protection of Nature will be held in Edinburgh, Scotland, June 20-28, 1956.** Requests for advanced information and registration forms should be addressed to: *Roger Heim, President, 42, Rue Montoyer, Brussels, Belgium.*

• A $1000 gift to establish the **Horace W. Stunkard Biology Prize** at New York University has been made by an alumnus, Jacob Taub, in honor of his former teacher. Dr. Taub is Director of Laboratories at Westchester Square Hospital, the Bronx, and Assistant Professor of Pathology at New York Medical College. The Stunkard Prize will be awarded annually to the biology major at University College who on the basis of scholarship and personality shows the greatest professional promise.

• **The American Documentation Institute's annual meeting and exhibition of documentation devices and equipment will be held at the Penn-Sherwood Hotel, Philadelphia, Pa., on November 2-4, 1955.** Further information may be obtained from James L. Olsen, Jr., Smith, Kline & French Laboratories, Philadelphia 1, Pa.

• **Arthur W. Galston,** Associate Professor of Biology at the California Institute of Technology, became Professor of Biology at Yale University, September 1st.

• **William R. Duryee,** formerly with the Carnegie Institution of Washington, is now Research Professor of Physiology, School of Medicine, The George Washington University.

• **The Tenth International Congress of Entomology** will be held in Montreal, Canada, August 17-25, 1956, at McGill University and the University of Montreal. Fifteen sections have been tentatively planned and several excursions arranged in connection with the Congress. Those wishing to receive further information with a view to attending the Congress should notify the Secretary as soon as possible: J. A. Downes, Division of Entomology, Science Service Bldg., Ottawa, Ontario, Canada. Only those requesting information will be sent application forms and a booklet about the Congress.

• **The Arthur McCallam Fund,** a $200,000 general endowment fund, has been established at the California Institute of Technology. Scholarships and fellowships in the biological sciences will be part of the provisions of the Fund.

• **The Committee on Growth of the National Research Council invites applications for Grants for Scholars in Cancer Research offered by the American Cancer Society.** The purpose of these grants is to assist institutions in the support of young scientists during the critical early period of their careers as independent investigators. Grants are awarded for 3 years ($6000 per year) with renewal for 2 additional years unless there are compelling reasons to the contrary. *Applications must be submitted by institutions on behalf of candidates not later than January 1, 1956.* Application blanks may be obtained from the Executive Secretary, Committee on Growth, National Research Council, 2101 Constitution Avenue, Washington 25, D.C.

• **Franklin S. Cooper,** research scientist and physicist has been elected President and Director of Research of Haskins Laboratories, New York to succeed Caryl P. Haskins who has resigned to accept the presidency of the Carnegie Institution of Washington on January 1, 1956. The Haskins Laboratories, a non-profit scientific and educational foundation, undertakes scientific research and research training projects in selected borderline fields. Dr. Cooper has been associate director of research since 1939.

• **Glenn S. Pound** has succeeded G. W. Keitt as Chairman of the Department of Plant Pathology at the University of Wisconsin.

• **G. B. Sanford** has retired as Pathologist-in-Charge of the Science Service Laboratory at Edmonton, Alberta to be succeeded by **L. E. Tyner.**

• At Pennsylvania State University, **W. S. Beach** has retired as Professor of Plant Pathology after 37 years on the staff.

• **William J. Riemer,** formerly of the University of California, Berkeley has joined the Florida State Museum as Assistant Curator of Biological Sciences.

• **George H. Boyd** has relinquished his duties as Head of the Dept. of Zoology at the University of Georgia to devote full time to the positions of Dean of the Graduate School and Director of Research. Dr. Boyd has been replaced as Head of the Zoology Dept. by **R. Barclay McGhee.**

• **H. Bentley Glass,** Johns Hopkins University and President of AIBS, has been appointed to the Advisory Committee on Biology and Medicine to the Atomic Energy Commission to succeed Curt Stern. This appointment is for a 6 year term, beginning July 1, 1955.

• The Rockefeller Institute for Medical Research has announced the appointment of **Frank L. Horsfall, Jr.,** a Member of the Institute, to the position of Vice-President for Clinical Studies and Physician-in-Chief. **Douglas Whitaker,** Provost and Professor of Biology at Stanford University, has been appointed Vice-President for Administration at the Rockefeller Institute.

• **Samuel L. Meyer,** former Executive Director of AIBS and Head of the Botany Department at Florida State University, Tallahassee has accepted the position of Dean of Central College, Missouri, effective September 1, 1955.

• **The Division of Medical Sciences, National Academy of Sciences–National Research Council, is accepting applications for grants-in-aid of research in three specialized fields:**

(1) **The Committee on Problems of Alcohol** has available a limited fund for the support of grants. The Committee is interested in fostering research, primarily on the physiological, biochemical and pharmacological effects of alcohol. Applications for the fiscal year 1956-1957 should be postmarked not later than January 15, 1956.

(2) **The Committee for Research in Problems of Sex** is concerned with encouraging research, primarily on the mechanisms controlling sexual behavior in animals and man. Proposals involving endocrinological, neurological, psychological, anthropological, phylogenetic and genetic studies directed toward this objective are therefore invited. Requests will also be considered that deal with the physiology of reproduction or with related biological and biochemical fields. Applications for the fiscal year 1956-1957 should be postmarked on or before February 1, 1956.

(3) **The Committee on Drug Addiction and Narcotics** may have available for the coming year limited resources for the support of research in the fields of analgesia and addiction. The Committee also invites information on basic research being carried on in these fields, in order that it may extend its activities as a center for the exchange of information on current investigations in this area.

Further details and application blanks may be obtained by writing to the appropriate committee of the Division of Medical Sciences, National Academy of Sciences–National Research Council, 2101 Constitution Avenue, N.W., Washington 25, D.C.

• **The 20th International Physiological Congress** will be held July 29-August 4, 1956 in Brussels, Belgium.

• The Carnegie Institution of Washington has announced the appointment of **James D. Ebert,** Professor of Zoology at Indiana University, as Director of the Institution's Department of Embryology to succeed **George W. Corner.** Dr. Corner, upon retirement, January 1, 1956, will join the staff of the Rockefeller Institute for Medical Research, New York, as historian.

• **Archie Carr,** who delivered the main address at the 1954 AIBS meetings at Gainesville, has received an NSF grant of $18,000 to initiate a long-range research project on the turtles of the Caribbean.

• **Lloyd V. Berkner,** President of the Associated Universities, Inc., which administrates the Brookhaven Laboratories, was elected President of the International Council of Scientific Unions (ICSU) at the 7th triennial General Assembly in Norway, August 9-13, 1955. Other officers are: Vice-Presidents: K. S. Krishnan (India), P. Lejay (France); Treasurer: E. Herbays (Belgium); Secretary General: A. V. Hill (United Kingdom). The 7th General Assembly provided for the appointment of a special committee to plan a symposium on the organization of international science to be held at the time of the next General Assembly in the United States; elected the U.S.S.R. to membership in the ICSU; authorized the appointment of a scientific committee to investigate the hazards of radiation; and offered its scientific cooperation in the similar study proposed in the United Nations.

• The Dept. of Health, Education and Welfare has announced that, as a result of negotiations, the United States Mission to India and the U.S. Embassy in India have secured the agreement of the Government of India to permit the **continued exportation of Rhesus monkeys** for medical research and the production of antipoliomyelitis vaccine. All needs, however, must be certified by the U.S. Government through the Public Health Service. Information about procedure and Certificate of Need forms may be obtained from: National Institutes of Health, Room 1012, Bldg. T-6, Bethesda 14, Md.

• **The Universal Copyright Convention,** sponsored by UNESCO, is now in force. Ratified by 15 nations, including the United States, and designed by 30 others, the Convention greatly simplifies the maze of technicalities previously required to obtain international copyright protection. Each country which ratifies the Convention will extend to the artists, composers and authors of all other ratifying nations the same copyright protection that it affords to its own nationals. In this country under the Convention, protection may be secured for works originating in other states by simply printing on each copy of the work a letter "C" within a circle accompanied by the author's name and the date of the first publication. Protection is guaranteed for a minimum of 25 yrs. either from the time of the work's first publication or from the death of the author. Authors are further assured of a reasonable fee from the publisher for translation rights.

• **Francis O. Schmitt** has been appointed Institute Professor at the Massachusetts Institute of Technology. Dr. Schmitt becomes the second Institute Professor, a distinguished academic post which recognizes outstanding achievement and gives its incumbent freedom to concentrate on research and advanced teaching. The only other member of the Institute's faculty who holds this rank at present is John C. Slater, the distinguished solid state physicist. Dr. Schmitt has been head of the Department of Biology for the past 14 years. **Irwin W. Sizer,** associate professor of biochemistry, has been appointed to fill this position.

• **Applications are now being received in connection with the National Science Foundation's Fifth Annual Graduate Fellowship Program.** Applications may be obtained from the Fellowship Office, National Research Council, Washington 25, D.C. The closing dates for receipt of applications are December 19, 1955 for postdoctoral applicants and January 3, 1956 for graduate students working toward advanced degrees in sciences. The selections will be announced on March 15, 1956.

NSF Fellowships are awarded to American citizens who will begin or continue their studies at the graduate level in the mathematical, physical, biological, medical, engineering, and other sciences during the 1956-57 academic year. For the first time this year, the Foundation will award fellowships in fields of convergence between the natural sciences and the social sciences. Approximately 20 fellowships will be awarded in such convergent fields as mathematical economics, demography, information and communication theory, and the history and philosophy of science. Selection will be made solely on the basis of ability. Stipends vary from $1400 for first year Fellows to $3400 for postdoctoral Fellows. Dependency allowances will be made to all married Fellows. Tuition and laboratory fees and limited travel allowances will also be provided. An NSF Fellow may attend any accredited non-profit institution of higher education in the U.S. or similar institutions abroad.

• A special grant from the Rutgers Research and Endowment Foundation, along with the kind cooperation of the Williams and Wilkins Company and the Rutgers University Press, has made it possible to offer copies of **the following books for free distribution to established libraries, hospitals, and other institutions.**

Waksman, S. A., ed. "Streptomycin; Nature and Practical Application." Williams and Wilkins Company. Waksman, S. A., ed. "Literature of Streptomycin." Rutgers University Press. Requests should be addressed to: *R. A. Day, Librarian-Editor, Institute of Microbiology, Rutgers University, New Brunswick, N.J.*

• Word has been received of the death of **John E. Potzger,** of a heart attack on September 18. Dr. Potzger was Head of the Botany Department of Butler University and recently President of the Ecological Society of America. A Memorial Scholarship in Botany is being established at Butler University and persons wishing to make donation should send checks to the Botany Department, Butler University, Indianapolis 8, Indiana. made payable to the **J. E. Potzger Memorial Scholarship Fund.**

• For the eighth consecutive year the **National Paraplegic Foundation is awarding fellowships to be used for research in basic and medical sciences bearing on the problems of paraplegia.** The fellowships are open to residents of the U.S. or Canada who have demonstrated ability in research. Persons to whom fellowships are awarded are expected to devote full time to research during tenure of the fellowship, except that, by permission of the Medical Advisory Committee, they may attend advanced courses of study which require only a limited portion of their time. Preference is given to candidates whose primary interest is in the field of spinal cord function and disease, or in complications arising from spinal cord injury. Appointments run for one to three years, subject to renewal for additional periods. The stipend ranges up to $3000-$4000 yearly with the actual allowance depending upon the past record of the applicant in scientific work, the family obligations which he carries, and the cost of living in the location chosen for study. In exceptional cases grants may be made as high as $6000. In 1955-56 the following awards were made: **Abraham Reife,** Duke University, was awarded the Raymond C. Henyan Fellowship; the Doris Duke Foundation Fellowship was given to **Paul Greengard,** who is working at the National Institute of Medical Research in London, England; **John A. Gergen,** Harvard Medical School, was awarded the Earl H. Kirkland Fellowship; **Calvin C. Turves,** Indiana University, Medical Center, received a renewal of the Herman F. Braeckel Fellowship; and the first American Turf Fellowship was awarded to **Robert Stern,** Yale University.

• **The Microcard Foundation** has completed a move from Middletown, Conn., to Madison, Wisconsin, where it will be affiliated with the University of Wisconsin Press. The active management of the Foundation will be in the hands of Thompson Webb, Jr., the Director of the Press, and all orders for Foundation materials should be sent to Microcard Foundation, Box 2145, Madison 5, Wisconsin.

• **Vernon Bryson** has been appointed Program Director for Genetics and Developmental Biology at the National Science Foundation. Prior to accepting this position, Dr. Bryson was with the Long Island Biological Laboratory, Cold Spring Harbor.

• **Rogers McVaugh,** on leave of absence from the University of Michigan, has been named Program Director for Systematic Biology at the National Science Foundation. Dr. McVaugh has been Professor of Botany at Michigan since 1946 and Curator of Phanerogams in the Herbarium.

• **The Lalor Foundation has announced details about forty summer awards in the biological sciences for 1956.** These awards, designed for younger members of college and university faculties (age limit 40) are for advanced study and research employing chemistry or physics to attack problems in any field of biology. Stipends range from $900 for a single person to $1200 for a married person taking the award at another institution. Studies may be conducted at any institution chosen by the recipient. Inquiries about the Lalor Faculty Summer Research Awards should be addressed to the Director, Lalor Foundation, 4400 Lancaster Pike, Wilmington 5, Delaware. Final date for receipt of applications is January 14, 1956 and notification of appointment will be made by March 15, 1956.

• **The First International Conference on the Use of Antibiotics in Agriculture,** both plant and animal, was held in Washington, D.C., October 19-21, 1955. The National Academy of Sciences-National Research Council sponsored the Conference and support was supplied by American Cyanamid Company, Merck & Company, Charles Pfizer & Co. and E. R. Squibb & Sons. Invitations to participate were extended to 44 leading research scientists in Europe, South Africa, Australia, Latin America and the U.S.A. Cooperating in the project was the Agricultural Research Service of the Dept. of Agriculture, and Secretary Ezra T. Benson greeted the invited scientists October 18th. Further information may be obtained from Howard I. Cole, Conference Secretary, NRC, 2101 Constitution Ave., Washington 25, D.C.

From the Societies

• At a recent meeting, Sept. 9-10, in Woods Hole, Mass., the **Society of General Physiologists** elected the following officers: President: C. Stacy French; Vice-President: Daniel Mazia; Treasurer: Irvin M. Klotz; Secretary: A. M. Shanes, National Institutes of Health, Bethesda, Md. The annual symposium for 1955 was organized by T. H. Bullock on "Physiological Triggers". The monograph of the 1954 symposium, "Electrolytes in Biological Systems" can now be purchased from the American Physiological Society, 9650 Wisconsin Ave., Bethesda, Md., for $4.00. The Society of General Physiologists will hold their 1956 meeting at the University of Connecticut in September.

• Officers to serve the **Society for Industrial Microbiology** for the remainder of 1955 and until September 1956 are as follows: President: H. B. Woodruff; Vice-President: J. M. McGuire; Secretary-Treasurer: C. L. Porter, Purdue University, Lafayette, Ind.

• The 1955-56 officers of the **American Dairy Science Association** are: President: I. A. Gould; Vice-President: C. F. Huffman; Secretary-Treasurer: H. F. Judkins, White Plains, N.Y.

• **The Potato Association of America** elected the following officers for 1955-56: President: C. W. Frutchey; Vice-President: R. W. Hougas; Treasurer: J. C. Campbell; Secretary: W. J. Hooker, Michigan State University, East Lansing, Mich.

• **The American Society for Horticultural Science** elected the following officers during the recent annual meetings at Michigan State University: President: M. B. Davis; Vice-President: L. D. Davis; Secretary-Treasurer: Freeman S. Howlett, Ohio Agric. Exper. Station, Wooster, Ohio.

The 1955 awards made by the Society were: The Alex Laurie Award in Floriculture and Ornamental Horticulture was made to *Henry M. Cathey,* Cornell University; *Lennart B. Johnson,* University of California, received the Leonard H. Vaughan Award in Floriculture; The Charles G. Woodbury Award in Raw Products Research was made to *Otmar Silberstein,* Westfield, N.Y.; The Leonard H. Vaughan Award in Vegetable Crops was received by *C. M. Geraldson,* Bradenton, Fla.; and the J. H. Gourley Award in Pomology was made to *E. L. Proebsting, Jr.,* Prosser, Washington and *A. L. Kenworthy,* Michigan State University.

• At the 35th Annual Meeting of the **American Society of Mammalogists,** held in Los Angeles, Calif., June 12-16, the following officers were elected: President: William B. Davis; Vice-Presidents: Robert T. Orr and Stephen D. Durrant; Recording Secretary: Randolph L. Peterson; Corresponding Secretary: George C. Rinker; Treasurer: Caroline A. Heppenstall.

• The 1955 annual meeting of the **American Ornithologists' Union,** will be held October 25-30, at the Boston Museum of Science. Paper sessions will occupy the 26-28th and field trips Oct. 29-30.

• The 35th Annual Meeting of the **American Society of Ichthyologists and Herpetologists** was held in San Francisco June 27 to July 3, 1955. Meeting sessions and other events were held at the California Academy of Science, the Steinhart Aquarium, Stanford University and the Hopkins Marine Laboratory. Officers elected for 1956 were: President: Edward C. Raney; Vice-Presidents: L. M. Klauber, W. Frank Blair, Roger Conant; Treasurer: C. J. Goin; Secretary: A. B. Grobman, Florida State Museum, Gainesville, Fla. The Editor-in-Chief of *Copeia* is Fred Cagle; Ichthyological Editor: W. S. Grosline, Herpetological Editor: R. C. Stebbins.

• The 1955 annual meeting of the **American Phytopathological Society** will be held in Atlanta, Ga., with the A.A.A.S. in December. The meeting will feature a general symposium "The Use of TV in Teaching Plant Pathology."

• **"Results of 1954 Fungicide Tests"**, reprinted from a series of articles appearing in *Agricultural Chemicals*, may be purchased in bound and covered form for $1.00 per copy by sending orders with remittance to Dr. D. A. Roberts, Dept. of Plant Pathology, Cornell University, Ithaca, N.Y. The publication of these results is under the sponsorship of the American Phytopathological Society. It is a continuation of the publication of results formerly provided through a Supplement of the Plant Disease Reporter, Plant Disease Epidemics and Identification Sections, U.S.D.A.

• **The National Association of Biology Teachers has just published "Handbook for Teaching Conservation and Resource-Use".** This 450-page book was prepared by 200 teachers from 30 states and shows how they have incorporated conservation and resource-use teaching into their schools. The project was financed by a grant from the American Nature Association. The Handbook may be obtained through the office of the Project Leader, Dr. Richard Weaver, P.O. Box 2073, Ann Arbor, Mich., at a cost of $4.00 with a twenty-percent discount to schools. The proceeds will be used by the NABT Conservation Committee to continue its education activities in various states.

• The activities and opportunities offered by the **History of Science Society** may be of interest to many biologists. The Society was formed thirty years ago by a group of historians who were concerned about the gap between the humanities and science. Today many scientists as well are active in the organization. Among the activities of the Society are the support of scholarly publications in the history of science; the organization of annual meetings and other programs; the awarding of medals and prizes for outstanding contributions to the history of science; and the sponsorship and encouragement of local and regional sections of the Society. A quarterly journal, *Isis*, is published. Anyone interested in the history of science and its cultural influences is eligible for membership. Annual dues include a subscription to *Isis*. Regular membership is $7.50; special student membership, $5.00. The chairman of the membership commmittee is L. Pearce Williams, 137 College Street, Yale University, New Haven, Conn.

• The 55th Annual Meeting of the **Society of American Foresters** will be held in Portland, Oregon, October 16-19, 1955. Headquarters will be the Multnomah Hotel. "Converting the Old-Growth Forest" will be the theme of the meeting, and eleven technical sessions have been scheduled.

• ***Forestry Handbook,*** prepared by more than 100 specialists in forestry, general resource conservation, wildlife management, soil conservation, range management, and lumber and paper industries, under the sponsorship of the Society of American Foresters, has been published by the Ronald Press Company. Eight years in preparation, the *Forestry Handbook* presents a comprehensive coverage of the data, technique, and methods of modern American forestry.

• The 1955-56 officers of the **Poultry Science Association** are: President: J. H. Quisenberry; 1st Vice-President: T. B. Avery; 2nd Vice-President: H. R. Bird; Secretary-Treasurer: C. B. Ryan, Texas A & M College, College Station, Texas. Editor of *Poultry Science:* H. D. Branion, Ontario Agricultural College, Guelph, Ontario, Canada. The 1956 meetings of the Association will be held at North Carolina State College, Raleigh, N.C.

• New officers of the **Society of Protozoologists** are: President: L. R. Cleveland; Vice-President: Willis H. Johnson; Secretary: Norman D. Levine, College of Veterinary Medicine, Univ. of Illinois, Urbana, Ill. (re-elected). The Society plans to meet in 1956 at the University of Connecticut with AIBS.

• Officers of the **Ecological Society of America** for 1955-56 are: President: Henry J. Oosting; Vice-President: W. Frank Blair; Treasurer: Alexander C. Hodson; Secretary: John F. Reed, University of Wyoming, Laramie, Wyo.

During the recent East Lansing meeting of ESA, two awards were made. The *Eminent Ecologist Citation* was made to **A. H. Wright,** Professor Emeritus of Zoology at Cornell University and **Shelby D. Gerking,** Indiana University, received the *George Mercer Award* for an outstanding paper in ecology.

• **The Mycological Society of America** elected the following officers for 1956: President: Ralph Emerson; President-Elect: Donald P. Rogers; Vice-President: John R. Raper; Councilors (East): Leland Shanor, Wm. W. Diehl; Councilors (West): Gardner Shaw, R. K. Benjamin.

• Officers of the **Botanical Society of America** for 1956 are: President: Harriet B. Creighton; Vice-President: Wm. Randolph Taylor; Treasurer: Harry J. Fuller; Secretary: Harold C. Bold, Vanderbilt University, Nashville, Tenn.

• The **Phycological Society of America** elected 1955-56 officers during the East Lansing meetings: President: H. C. Bold; Vice-President: R. H. Thompson; Treasurer: R. C. Starr: Secretary: P. C. Silva, Dept. of Botany, University of Illinois, Urbana, Ill. The Secretary is also Editor of the *Phycological Society of America News Bulletin,* published quarterly.

• **The American Society of Tropical Medicine and Hygiene** will hold its 4th annual meeting November 2-5, 1955 at Hotel Somerset, Boston, Mass. Over sixty papers will be read, a symposium on "Newer Knowledge of Viral and Rickettsial Diseases" presented, and a special exhibit of scientific material shown. The 20th annual Charles Franklin Craig Lecture is to be given by Harold F. Gray, Oroville, Calif., and the Presidential Address, by William H. Taliaferro, will be on "The Functions of the Spleen in Immunity".

• The 1956 officers of the **American Society of Plant Physiologists** are: President: Harry A. Borthwick; Vice-President: Aubrey W. Naylor; Secretary: Arthur W. Galston, Dept. of Plant Science, Yale University, New Haven, Conn.

• **The American Society of Limnology and Oceanography** recently elected the following officers for 1956: President: Alfred C. Redfield; Vice-President: Robert C. Ball; Secretary-Treasurer: Bostwick H. Ketchum, Woods Hole Oceanographic Institution, Woods Hole, Mass.

Letters to the Editor

Dr. Bentley Glass' exhaustive study of abstracting in the biological sciences has served to focus the attention of biologists on the complex problem of communicating recorded scientific information.

New *AIBS Bulletin* readers will be interested to learn of a cross-disciplinary professional society, the American Documentation Institute, which is primarily concerned with the organization, retrieval and dissemination of recorded information. Founded in 1937, the ADI encourages investigation, holds program meetings, and publishes a quarterly journal: *American Documentation.* It is the American affiliate of the International Federation for Documentation, and operates a program of "auxiliary publication" (See *AIBS Bulletin* 4:16, July 1954).

ADI offers an opportunity for scientists, engineers, publishers and librarians to share experience and concentrate forces on solutions of scientific information problems.

Membership details are available on request from the Secretary, Library of Congress, Washington 25, D.C.

SCOTT ADAMS, President,
July 7, 1955 American Documentation Institute.

The A.I.B.S. Reports

• Under the sponsorship of the Office of Naval Research and the auspices of AIBS, **a symposium, "Molecular Structure and Biological Specificity" will be held October 28, 29, 1955 at the Woodner Hotel, Washington, D. C. Linus Pauling will be chairman** of the symposium and the following scientists will participate: David Pressman, Roswell Park Memorial Institute, "Molecular Complementariness in Antibody-Antigen Systems"; F. Haurowitz, Indiana University, "Molecular Complementariness in Antibody-Antigen Systems"; H. Jehle, University of Nebraska, "A Theory of Specific Attraction Between Identical Molecules"; J. G. Kirkwood, Yale University, "Intermolecular Forces"; Jerry Donohue, University of Wisconsin, "Theory of Van Der Waals Forces"; I. M. Klotz, Northwestern University, "The Interaction of Organic Ions With Proteins"; Herman Schroeder, Jackson Laboratory, E. I. duPont de Nemours and Company, "The Structure of Dyes in Relation to Reaction With Fibers"; Hans Neurath, University of Washington, "Physical and Chemical Structure Alterations Occurring in Activation of Proteolytic Enzymes"; E. B. Anfinsen, Jr., National Heart Institute, "The Structural Basis of Ribonuclease Activity"; K. S. Pitzer, University of California, "Molecular Shapes, Especially Orientation Around Single Bonds"; I. B. Wilson, Columbia University, "Specificity in Cholinesterase Reactions"; R. A. Alberty, University of Wisconsin, "Specificity in the Fumarase System"; Harvey A. Itano, National Cancer Institute, "Specificity in the Interaction of Sickle-Cell-Anemia Hemoglobin Molecules".

• **An AIBS Ad Hoc Committee on Biological Field Stations,** organized for the National Science Foundation, met in Washington, D.C. October 7-8. Fernandus Payne, Indiana University is Chairman of the Committee and members are as follows: Marston Bates, University of Michigan, Elmer G. Butler, Princeton University, Arthur D. Hasler, University of Wisconsin, and Alfred Emerson, University of Chicago. The Committee was formed to evaluate the needs and current situations of the biological field stations of the country and to advise the National Science Foundation on the best program to pursue in this area.

• **Two AIBS Advisory Panels for the National Science Foundation** have recently been set up. These panels will advise the Foundation on the worthiness of research proposals in two fields, Systematic Biology and Environmental Biology. The members of the two panels follow. *Advisory Panel for Systematic Biology:* John N. Couch, University of North Carolina; Alfred Emerson, University of Chicago; Libbie H. Hyman, American Museum of Natural History; David Keck, New York Botanical Garden; Remington Kellogg, U.S. National Museum; Ernst Mayr, Harvard University; A. C. Smith, U.S. National Museum; William C. Steere, Stanford University, and Norman R. Stoll, Rockefeller Institute for Medical Research. *Advisory Panel for Environmental Biology:* Murray F. Buell, Rutgers University; W. D. Billings, Duke University; George L. Clarke, Harvard University; W. J. Hamilton, Cornell University; Arthur D. Hasler, University of Wisconsin; Thomas Park, University of Chicago; C. Ladd Prosser, University of Illinois; and Paul B. Sears, Yale University.

• **The mid-winter Placement Service list of registrants** is being assembled now. The final deadline for receipt of applications is December 1, 1955. Any member of a Member Society of AIBS may register for $2.00; a member of an Affiliate Society for $5.00 and all others, $10.00. Registration covers the publication of one curriculum vitae. Employers interested in obtaining the list of registrants may do so for $1.00 by writing: AIBS Placement Service, 2000 P Street, N.W., Washington 6, D.C.

AIBS Governing Board Meeting

Michigan State University, Sept. 4, 1955

THE annual meeting of the AIBS Governing Board was held Sunday, September 4, prior to the opening of the AIBS Convention at Michigan State University. Thirteen of the nineteen Member Societies of the Institute were represented, and a number of invited guests were present.

Following the introductory remarks of the chairman and the treasurer's report, the necessity of additional support for the Institute was discussed. There are many activities of direct value to biology and biologists that AIBS would like to perform, but funds are not available. At the present time, a Member through his society dues to AIBS pays for a little more than his *Bulletin* subscription. The Board emphasized the necessity of a further appeal to all biologists to contribute to the Institute through individual memberships as well as through their society membership. Furthermore. if a member contributes, individually, he should have the opportunity of designating a recipient for his second *Bulletin* subscription. Suggested recipients were: high school libraries and teachers of biology, graduate students and high school students.

The Executive Director gave a report of AIBS staff activities and submitted the following future convention sites for the Board's approval: University of Connecticut, 1956; Stanford University, 1957; Indiana University, 1958.

AIBS standing committees were discussed, reorganized in part, and chairmen approved. These committees, and chairmen who have accepted are: Membership Committee, Orr Reynolds; Publications Committee, John Behnke; Editorial Board, Ronald Bamford; and Associates Committee. The chairman elaborated on the June meeting of the Committee on Basic Biological Research in Aging held at Brandeis University. The Board moved a vote of appreciation to the University for their efforts toward the success of the meeting. Following a discussion of the need for new committees, the Executive Committee was assigned the task of naming a Committee for the Determination and Establishment of Standards which may be used by accrediting and certifying agencies.

A detailed report of AIBS activities under the Office of Naval Research and National Science Foundation contracts was given. Since March 1, AIBS activities for ONR included three committee meetings, the Advisory Committee on Physiological Psychology, the Advisory Committee on Biochemistry, the Advisory Committee on Physiology; a symposum on "Molecular Structure and Functional Activity of Nerve Cells" held in Washington on June 3-4, 1955; and the appointment of a number of consultants to the Navy. A discussion of NSF contract activities since March 1 included a status report on the National Register for Scientific and Technical Personnel and a report on a Planning and Steering Committee Meeting for a Future Editor's Conference, held July 15-16. A meeting of the NSF *Ad Hoc* Committee on Biological Field Stations, planned for October 7-8, was also discussed.

The Committee on Revision of the Constitution presented the revised Constitution, article by article, and received approval.

Following the acceptance of the Constitution, the Nominating Committee presented the following slate of officers for 1956: President, H. Bentley Glass; Vice-President, Wallace O. Fenn; Secretary-Treasurer, Raymund L. Zwemer. Possible absence from the country necessitated the withdrawal from nomination of R. L. Zwemer. A. C. Smith was then nominated to fill the position of Secretary-Treasurer. All nominees were elected unanimously. W. R. Duryee was then nominated and elected to fill the Executive Committee vacancy created by Dr. Smith's election to the above office.

I. C. M.

The Biology Library

One copy of each publication submitted for listing should be sent to the Editor, AIBS Bulletin, 2000 P Street, N.W., Washington 6, D. C. Only books published within a year of receipt will be reviewed.

ANIMAL SCIENCES

Introduction to Parasitology. ASA C. CHANDLER, 799 pgs., 257 figs. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (9th edition, 1955) $8.50.

A new edition of this very popular parasitology text is welcome. Outstandingly successful for over 35 years, the general plan has not been altered in this revision. Greater emphasis has been placed on diseases of current world importance, such as leptospirosis, amebiasis, schistosomiasis, onchocerciasis and leishmaniasis. The increasing danger of introduction of parasites from abroad into America is stressed and the growing importance of chronic parasitic diseases in underdeveloped countries pointed out. Bibliography and illustrations have been enlarged and modernized.

Investigations on Genetic Aspects of Carcinoma of the Stomach and Breast. CHARLES M. WOOLF. 349 pgs. University of California Press, Berkeley 4, Calif. (1955) $1.00, paper bound.

This study was carried out in Utah, taking advantage of a closely-knit population group and the excellent genealogical records of the families affiliated with the Mormon Church. The objectives of the study were: to determine whether familial tendencies could be shown for the two types of neoplasia; if present, to determine the magnitude of these tendencies; and to determine whether the familial tendencies were limited to specific organs or if they were of a more general nature.

The Origin of Vertebrates. N. J. BERRILL. 257 pgs. Oxford University Press, 114 Fifth Ave., New York 11, N.Y. (1955) $4.00.

The author is an expert on ascidians and other tunicates and in this book he traces the part they seem to have played "in the far distant prechordate and prevertebrate past of our own lineage". The most basic features of the vertebrate body are shown to have originated in response to certain environmental changes. The story developed is logical and based on relevant facts. Since no fossil remains can verify or deny his assumptions, Dr. Berrill's hypotheses may be as acceptable as any we will ever have offered.

The Black Flies (Diptera, Simuliidae) of Guatemala and Their Role as Vectors of Onchocerciasis. HERBERT T. DALMAT. 425 pgs., 44 plates. Vol. 125, No. 1. Smithsonian Institution Publications, Washington, D.C. (1955) Paper bound.

This extensive study offers a core of information upon which any battle with onchocerciasis may be waged. The Simuliidae, vectors of the disease, are thoroughly discussed—taxonomy, ecology and distribution, biting habits, resting places, flight range and longevity. The present epidemiological factors in Guatemala, involved in the transmission of the disease, indicate control methods that may be applied to other regions where onchocerciasis is a scourge.

The Physiology of Diapause in Arthropods. A. D. LEES. 151 pgs. Cambridge University Press, 32 East 57th St., New York 22, N.Y. (1955) $2.50.

Intensive research on diapause in the last two decades has shown that it is controlled by hormones yet linked to definite external stimuli, such as temperature and length of day. The metabolic and biochemical processes involved are now much better known. Results obtained from a wide variety of research are reviewed and integrated in this little volume by A. D. Lees of Cambridge University. It is the fourth in the new series *Cambridge Monographs in Experimental Biology*.

Kinships of Animals and Man. ANN H. MORGAN. 839 pgs., illus. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (1955) $6.75.

"Separateness does not exist in the living world, except in human thinking of it" claims the author. Her textbook is built around this truth. Ecology is emphasized—all animals are studied both as social beings associated with an environment and as individuals with complex internal environments affected by their external ones. The text reads well, illustrations are ample and well-chosen supplementary reading is suggested for each chapter.

Malayan Animal Life. M. W. F. TWEEDIE and J. L. HARRISON. 237 pgs., 154 illus. Longmans, Green and Co., 55 Fifth Ave., New York 3, N.Y. (1955) $2.50.

This book appears to have been written for high school biology students in Malaya, or for visitors to the country. The contents, however, should be of considerable interest to young naturalists in this country. Samples of the enormous Malayan fauna are chosen from mammals, birds, reptiles, amphibians, salt and fresh-water fish, insects, shore and other invertebrates. The Malayan, English and scientific names are given in most cases.

An Evaluation of the Red Fox. THOMAS G. SCOTT. 16 pgs. Biological Notes No. 35, Illinois Natural History Survey Division, Urbana, Ill. (1955).

PLANT SCIENCES

Corn and Corn Improvement. Edited by GEORGE F. SPRAGUE. 699 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $11.50.

This is Volume V in a series of monographs being prepared under the auspices of the American Society of Agronomy. Fourteen authors contribute chapters, the subject matter of which can be divided into breeding, production and utilization. Under breeding are included such topics as history and origin, morphology, cytogenetics and breeding. The general topic of production includes climatic requirements, mineral nutrition, culture, production of hybrid seed, the special crops, sweet corn and popcorn, and diseases and insect pests. Utilization is treated under the headings of industrial utilization and corn as livestock feed.

Range Management. LAURENCE A. STODDART and A. D. SMITH. 433 pgs., 156 figs. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (2nd edition, 1955) $7.00.

After more than a hundred years of intensive use of the western range of the United States, it has become increasingly obvious that no new frontiers exist and that present resources must be made to last. The science of range management has, consequently, developed at a rapid rate, stimulated not alone by the scientist but by the rancher as well. *Range Management*, besides being an eminently useful text, is interesting reading for anyone who would know more about one of our important natural resources.

Horticultural Science. GORDON T. NIGHTINGALE. 111 pgs. Horticultural Publications, Rutgers University, New Brunswick, N.J. (1955) $2.50.

Horticultural Science is essentially a laboratory manual for undergraduate students who have had plant physiology and

are now about to raise plants with and without various macro- and micro-nutritive substances and hormones. Sand culture technique and the maintenance of field logs are other subjects included in this handbook.

Analysis of Soils and Plants for Foresters and Horticulturists. S. A. WILDE and G. K. VOIGT. 117 pgs. J. W. Edwards, Publishers, Ann Arbor, Mich. (1955) $3.75.

Most research in soils has been confined, until recently, to soils supporting annual crops. This small book discusses the subject in terms of perennial crops, such as forests, orchards and nurseries. Chapters include: Analysis of Physical Properties of Soils; Analysis of Chemical Characteristics of Soils; Analysis of Ground Water; Analysis of Biological and Microbiological Properties of Soils, Organic Residues and Composts; Floristic and Mensuration Analyses; Analysis of Plant Tissue; and Analysis of Nursery Stock.

Cotton Growing Problems. B. G. CHRISTIDIS and G. J. HARRISON. 633 pgs., 161 figs. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (1955) $9.75.

Any student of cotton growing anywhere in the world can turn to this new book for answers to his problems. Seldom has a reference book been written with such breadth. The underlying principles of most problems and the experimental evidence for new cultural methods are two large areas of discussion. Topics covered for the first time in such a text include modern insecticides, irrigation practices, chemical weed control, chemical defoliation, and mechanical harvesting. Liberal use has been made of world-wide research results.

The Genus Nicotiana. THOMAS H. GOODSPEED. 536 pgs., 118 plates. Chronica Botanica Co., Waltham, Mass. and Stechert-Hafner, Inc., New York, N.Y. (1955) $12.50.

This comprehensive volume is the result of fifty years of study at the University of California Botanical Garden on one genus, *Nicotiana*. Fifty-six of the sixty species recognized, as well as many varieties, were grown and hybridized. This live collection permitted studies of comparative morphology and cytology, the results of which confirmed many of the author's phyletic hypotheses. The present distribution of all species of the genus is mapped and interpreted in the light of the geologic history of the Americas, Antarctica and Australasia. A complete evolutionary picture in charts shows the derivation of each of the sixty species.

Forestry Handbook. Edited by REGINALD D. FORBES. 1220 pgs., 744 illus. Ronald Press Company, 15 East 26th St., New York 10, N.Y. (1955) $15.00.

Forestry Handbook should immediately take its place on the scientific reference shelf with the *Handbook of Chemistry and Physics*. To the thousands of persons engaged in forestry and forest products industries, this book is a must. It contains the working methods and techniques, formulas, tables, converting factors and related data most commonly used. In addition information about watershed management, forest recreation, wildlife management and forest range management is supplied. Six years in preparation, an editorial board of 145 supplied guidance and material to the Society of American Foresters, under whose auspices the Handbook was prepared.

Forestry and Related Research in North America. FRANK H. KAUFERT and WM. H. CUMMINGS. 280 pgs. Society of American Foresters, Mills Bldg., Washington 6, D.C. (1955) $5.00.

This is the report of a study conducted by the Society of American Foresters under a grant from the Rockefeller Foundation. The study had as its objectives, "(1) reviewing the progress in forestry and related research in North America during the past quarter century, (2) determining the present status of research by all agencies, (3) assessing the adequacy of present research, and (4) formulating recommendations and goals for the next quarter century". The report is divided into three parts—forestry and related research in the United States, in Canada and in Mexico.

Trees and Shrubs of the Upper Midwest. CARL O. ROSENDAHL. 411 pgs., illus. University of Minnesota Press, Minneapolis 14, Minn. (1955) $6.00.

The region covered by this guide extends roughly south from Manitoba through Minnesota, most of Wisconsin, the eastern half of the Dakotas and parts of Iowa, Illinois and upper Michigan. Not only does Dr. Rosendahl supply descriptions, keys, geographic distribution and common names, but includes, for gardeners and home landscape planners, information about the qualities, uses and adaptability of various species. Illustrations are attractive and plentiful.

Contributions to Plant Anatomy. IRVING W. BAILEY. 259 pgs., 23 plates. Chronica Botanica Co., Waltham, Mass. and Stechert-Hafner, Inc., New York, N.Y. (1955) $7.50.

The selected papers of one of America's greatest plant anatomists, Irving W. Bailey of Harvard University, appear in this volume. In his preface Dr. Bailey writes, "the papers in this book have been selected and arranged to illustrate successive attempts between 1909-1953 to bridge the gaps between Plant Anatomy and other fields of scientific endeavor". A biographical sketch of the author and a bibliography of his writings are included. B. G. L. Swamy has prepared novel, most attractive title page drawings and vignettes that greatly enhance the appearance of the book.

MISCELLANEOUS

Experimental Design and Its Statistical Basis. D. J. FINNEY. 169 pgs. University of Chicago Press, 5750 Ellis Ave., Chicago 37, Ill. (1955) $4.50.

The author, who is at the University of Aberdeen, Scotland, says of his book, "(It) is an attempt to outline the theory and practice of that branch of statistical science generally known as *experimental design*, in a form that will be intelligible to students and research workers in most fields of biology". Dr. Finney succeeds in this attempt. A general essay on the function of statistics in science is followed by simple studies in biology and clinical medicine and the examination of standard types of design used in many fields of biology.

The Structural Relations of Natural Products. SIR ROBERT ROBINSON. 150 pgs. Oxford University Press, 114 Fifth Avenue, New York 11, N.Y. (1955) $4.00.

Dr. Chaim Weizmann, first President of the State of Israel, was an outstanding chemist as well as the founder of his country. After his death in 1952, a series of Weizmann Memorial Lectures were instituted in his honor, to be given each year at Rehovoth by eminent scientists in various fields. This volume contains the first in the series, given in 1953 by Sir Robert Robinson, foremost British chemist and a long-time friend of Dr. Weizmann. The subject is concerned with a comparison of the molecular structures of plant products. The author shows how these structures throw light on genetic relationships and biosynthesis.

Dielectric Behavior and Structure. CHARLES P. SMYTH. 441 pgs. McGraw-Hill Book Co., 330 West 42nd St., New York 36, N.Y. (1955) $9.00.

Anyone engaged in the study of organic molecules will be interested in this book. The second half is concerned with dipole moments, their determination, a general account of their relations to molecular structure, and detailed tabulation of the moments of the principle types of compounds. Amino acids,

peptides and proteins are treated in one chapter and induced polarization, particularly optical refraction, is discussed in the last chapter. The author, Professor of Chemistry at Princeton University, is an outstanding authority in this field.

Recent Progress in Hormone Research. Vol. XI. Edited by GREGORY PINCUS. 518 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $10.00.

This volume contains the papers presented at the 11th Annual Laurentian Hormone Conference, held at Mont Tremblant, Quebec, Sept. 5-10, 1954. An outstanding group of investigators were present and subject areas discussed were: Pituitary Hormones; Steroid Chemistry and Biochemistry; Hormones and Abnormal Growth; Hormones and Aging in Man; Mechanism of Hormone Action; and Hormone-Cardiovascular Interrelations.

Antimetabolites and Cancer. C. P. RHOADS. 318 pgs., 50 illus. American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington 5, D.C. (1955) $5.75 ($5.00 to AAAS Members).

A symposium presented in December 1953 at the Boston meeting of the AAAS forms the basis of this volume. A portion of the preface reads "Preliminary data coming to hand strongly suggests that the antimetabolite principle may well turn out to be a most important implement for the definition of the biochemical changes inherent in the neoplastic process, changes upon which any rational therapeutic attack must be established and because of which specific therapy is possible". Twenty outstanding research workers in the field discuss various antimetabolite studies.

Luminescence of Biological Systems. FRANK H. JOHNSON. 466 pgs., 161 illus. American Association for the Advancement of Science, 1515 Massachusetts Ave., Washington 5, D.C. (1955) $7.00 ($6.00 to AAAS Members).

The past several years have been marked by considerable progress in the field of bioluminescence, due to an increasing number of investigators, the introduction of new methods of analysis and measurements, as well as ever expanding knowledge in related fields. To gather together the latest ideas and the men who advanced them, a Conference on Luminescence was held March 28-April 2, 1954 at Asilomar, Calif. under the sponsorship of the Committee on Photobiology of the National Research Council and the support of the National Science Foundation. The seventeen papers presented at that time are published under this title.

The Chemistry and Fertility of Sea Waters. H. W. HARVEY. 224 pgs. Cambridge University Press, 32 East 57th St., New York 22, N.Y. (1955) $5.50.

In this technical little book, Dr. Harvey of the Marine Biological Association, Plymouth, summarizes recent investigations in the chemistry of salts and dissolved gases in sea water; the changes brought about by plants, animals and bacteria; oceanic mixing; and the physical properties of sea water. Since much of our present knowledge rests upon analyses of microconstituents, the author has added a review of modern analytical techniques.

Pilot Plant Techniques of Submerged Fermentation. Special English Edition of Rendiconti Instituto Superiore di Sanita, Vol. 17. 243 pgs. Interscience Publishers, 250 Fifth Ave., New York 1, N.Y. (1954) $8.10.

The Instituto Superiore di Sanita in Rome is one of the outstanding research centers of Europe. This is the first English edition of its publication, *Rendiconti,* and it is devoted to a subject of concern to the International Research Center for Chemical Microbiology at the Institute. The work described deals primarily with the technical aspects of submerged fermentation, with special attention given to aeration studies and the design of fermenters for the bulk production of non-pathogenic microorganisms or their metabolic products.

The Caves Beyond; The Story of Floyd Collins' Crystal Cave Explorations. JOE LAWRENCE, JR. and ROGER W. BRUCKER. 283 pgs., illus. Funk and Wagnalls, 153 East 24th St., New York 10, N.Y. (1955) $4.75.

In February 1954 the National Speleological Society sent a large, well-equipped expedition into the caverns that stretch beyond Crystal Cave, Kentucky. This book is an account of the expedition, of its organization and operation, the medical aspects, and the findings in geology, hydrology, biology and cave atmosphere. Human-interest narratives are included and the writing is definitely not scientific.

Advances in Genetics. Vol. VII. Edited by M. DEMEREC. 309 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.00.

Academic Press' contribution to biology and medicine through the publication of yearly 'Advances' is considerable. The 7th volume in the Genetics series contains chapters by the following authors: Vernon Bryson and W. Szybalski, Microbial Drug Resistance; A. A. Buzzati-Traverso, The "Obscura Group" of the Genus Drosophila; A. Brito da Cunha, Chromosomal Polymorphism in the Diptera; J. A. Moore, Abnormal Combinations of Nuclear and Cytoplasmic Systems in Frogs and Toads; P. B. Sawin, Recent Genetics of the Domestic Rabbit; R. Takahashi, The Origin and Evolution of Cultivated Barley.

Genetics and Metabolism. ROBERT P. WAGNER and HERSCHEL K. MITCHELL. 444 pgs., 119 figs. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $7.50.

The authors believe that "inheritance is characterizable in terms of transmission of control of relative rates of biochemical reactions within complex and interlocked metabolic patterns". This book brings together a variety of facts and ideas from the fields of genetics and biochemistry to support this thesis. The book is written primarily for advanced undergraduate or beginning graduate students of genetics, biochemistry or microbiology. A general introductory chapter, however, will assist those with an inadequate background. An objective treatment of controversial topics, a number of unusual approaches, and an awareness of the limitations of research to date distinguish this volume.

Advances in Cancer Research. Vol. III. Edited by JESSE P. GREENSTEIN and ALEXANDER HADDOW. 359 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $8.50.

This is the 3rd volume in the well-known series, *Advances in Cancer Research.* The contributors to this volume are: Richard Doll, Etiology of Lung Cancer; Harold P. Morris, Experimental Development and Metabolism of Thyroid Gland Tumors; A. Pullman and B. Pullman, Electronic Structure and Carcinogenic Activity and Aromatic Molecules: New Developments; P. Rondoni, Some Aspects of Carcinogenesis; M. B. Shimkin, Pulmonary Tumors in Experimental Animals; and Sidney Weinhouse, Oxidative Metabolism of Neoplastic Tissues.

Stratigraphical Palaeontology. A Study of Ancient Life-Provinces. E. NEAVERSON. 806 pgs., illus. Oxford University Press, 114 Fifth Ave., New York 11, N.Y. (2nd edition, 1955) $16.50.

An immense book, *Stratigraphical Palaeontology* deals with an immense subject. Dr. Neaverson's second edition retains most of the features of the original work, notably the descriptions and illustrations of the British faunas. However, the scope has been widened by the addition of synopses of extra-British faunas in marine and continental habitats. In a final new chapter, the author discusses the relations of the continents and oceans and expresses the hope that his interpretations will lead to further investigation and revaluation.

Great Experiments in Biology. MORDECAI L. GABRIEL and SEYMOUR FOGEL. 317 pgs. Prentice-Hall, 70 Fifth Ave., New York 11, N.Y. (1955) $3.95.

Sometime before a biology major graduates he should be asked to read this book. The authors have collected and assembled excerpts from the original writings of many of the "greats" of biology—writings that tell of first discoveries and that often convey the excitement that accompanied the experiments. Names become personalities and statements in textbooks become events. The selections appear under seven headings: The Cell Theory, General Physiology, Microbiology, Plant Physiology, Embryology, Genetics and Evolution, and each section is preceded by a chronology

Origins of Resistance to Toxic Agents. M. G. SEVAG, ROGER D. REED and ORR E. REYNOLDS. 471 pgs. Academic Press Inc., 125 East 23rd St., New York 10, N.Y. (1955) $12.00.

A symposium sponsored jointly by the Office of Naval Research and the University of Pennsylvania is presented in this book in its entirety. Topics include: Resistance to Microbes; Resistance to Herbicides and Insecticides; Tolerance and Addiction to Drugs and Alcoholism; Resistance Factors, Infectious Agents and Cancer Cells; and Physiological, Chemical and Genetic Viewpoints. The twenty-eight specialists who presented papers did so not alone to pool data but to fit their material, assertions or denials, around current concepts of the central theme.

Correction

In the July 1955 issue, the title of a book by Raymond A. Paynter, Jr. read "The Ornithology of the Yucatan Peninsula". The title should have read, "The Ornithogeography of the Yucatan Peninsula".

LABORATORY MANUALS

Atlas of Outline Drawings for Vertebrate Anatomy. SAMUEL EDDY, C. P. OLIVER and J. P. TURNER. 106 plates, perforated pages. John Wiley & Sons, 440 Fourth Ave., New York 16, N.Y. (1955) $3.25.

Laboratory Studies in Biology. Observations and Their Implications. CHESTER A. LAWSON, R. W. LEWIS, M. A. BURMESTER and GARRETT HARDING. 336 pgs., 131 illus. W. H. Freeman and Co., San Francisco, Calif. (1955) $3.50.

Biological Education

Editor's Note. The scientific manpower situation in the United States is held to be serious. One of the most acute current shortages is in the science teaching field. This column, *Biological Education*, is being initiated to bring to the 15,000 readers of the *Bulletin* reports of educational conferences and studies, descriptions of remedial projects, new and interesting teacher aids, ideas and plans for community projects, assistance that colleges and universities might render to secondary school teachers, current statistics, and state and federal legislation in education. The cooperation of all biologists is requested in submitting brief reports of projects in which they are concerned or ideas they may care to share with others engaged in teaching biology.

• The American Association for the Advancement of Science, with the assistance of the National Science Foundation and the U.S. Office of Education, is sponsoring an experimental project during the school year 1955-56, known as **"Travelling Science Libraries for Small High Schools".** The objectives are: to develop an interest on the part of students in reading science books; to make available a larger fund of factual information than is now present in small schools; to develop a sounder basis for the choice of a career in science; to offer science teachers the opportunity of broadening their scientific reading; and to stimulate an interest on the part of the schools in purchasing similar collections for their libraries.

The collection will consist of 150 books covering the fields of anthropology, agriculture, astronomy, botanical sciences, biology, chemistry, engineering, forestry, geology and geography, history and philosophy of science, mathematics, meteorology, medical sciences, physics, psychology, and zoological sciences. The books have been chosen for easy readability and include only those that can be understood by persons with a limited background in science. Eleven geographical areas, with varying cultural and educational characteristics, have been selected. In each area six senior high schools in smaller communities have been chosen to receive the library. The books will be divided into six units of 25 books each, packed in a display type case. Each participating school will be permitted to retain each of the six units for four class weeks. A brochure describing the collection and its use, and containing a brief resume of each book will be sent to the school librarian and to the science teachers at each school before the books arrive. A copy of the resume will also be inserted in the front of each book. Teachers and librarians are being urged to make known the availability of the books and to encourage their students to read them, but they are not being asked to make required reading of the volumes.

• **A very worthwhile project, carried on by a university to assist high school teachers, has been underway for some time in the Biological Sciences Department of Purdue University.** A room is maintained in the department where teachers may come to use library books, have specimens identified, seek guidance about their courses or methods of instruction, and receive assistance in designing laboratory equipment for special experiments. Occasionally material or apparatus is loaned to the teacher. One member of the faculty is specifically assigned to this liaison work but all members are available when needed. Biology teachers in the high schools of the area now look to this department for willing cooperation and advice on their teaching problems.

Purdue biologists, however, do not sit and wait for the teacher to come to them. For the many science teachers in the state who are out of easy reach of Lafayette, special science consultants make trips about the state during the school year. The knowledge and know-how of these scientific "circuit-riders" are thereby made available to all science teachers.

• **Careers in Science Teaching,** prepared by the Future Scientists of America Foundation of the National Science Teachers Association, is now being revised and broadened in scope. It will be available shortly from the NSTA, 1201 16th Street, N.W., Washington 6, D.C.

• **Critical Years Ahead in Science Teaching,** a report of the Conference on Nation-wide Problems of Science Teaching in the Secondary Schools, held at Harvard University, July 15-August 12, 1953, is now available, without charge, from Mr. Elbert C. Weaver, Phillips Academy, Andover, Mass. The Conference was supported by the Carnegie Corporation of New York and the invited participants were: G. V. Benner, W. C. Forbes, G. P. Franck, W. F. Goins, Jr., Charlotte Grant, K. C. Johnson, P. G. Johnson, R. W. Lefler, A. J. MacLean, M. Meiste, J. E. Morris, E. M. Palmer, J. S. Richardson, H. A. Shannon, R. Sherman, R. Stollberg, H. B. Templeton, K. E. Vordenberg, and E. C. Weaver. Many highly pertinent facts are included in this report and all important aspects of the teacher shortage problem explored.

• College and University biologists, faced with the recurrent problem of developing really challenging and effective lab and field work for their students, will be interested in a projected series of **Sourcebooks of Laboratory and Field Studies for College Courses in the Biological Sciences,** planned by the Committee on Educational Policies of the NRC Division of Biology and Agriculture. As soon as financial support is assured, teaching biologists will be invited to contribute to these collections. The Sourcebooks will contain only new experiments and studies with fresh, stimulating approaches and ideas. A companion project is planned for a later date to help enliven biology teaching in secondary schools.

• For a report of the **Committee on Educational Policies** of the National Research Council, see page 17.

Biological Programs at AAAS Atlanta Meeting

December 26-31, 1955

The 122nd meeting of the American Association for the Advancement of Science in Atlanta, Georgia, will include some 300 sessions of 17 AAAS Sections and of 63 participating organizations. Programs of particular interest to biologists follow.

AAAS

General Session. "The Crisis in Science Education," *Dec. 29, a.m.* AAAS Council Meeting II. "What Can Organized Science Do to Solve the Shortages of Science Teachers and Future Scientists," *Dec. 30.*

Section O—Agriculture, and Oak Ridge Institute of Nuclear Studies

Symposium: "Atomic Energy and Agriculture." I. Soil-Plant Relationships, *Dec. 27, p.m.* II. Plant Metabolism, *Dec. 28, a.m.* III. Animal Metabolism, *Dec. 28, p.m.* IV. Food Sterilization, *Dec. 29, p.m.*

Section C—Chemistry

Symposium: "Pattern of Biochemical and Histological Responses to Chemical Agents." *Dec. 28, a.m., p.m.*

Section F—Zoological Sciences

Symposium, cosponsored by Amer. Soc. of Zoologists and Assoc. of Southeastern Biologists: "Formation and Early Development of the Embryo," *Dec. 27, a.m., p.m.* Zoologists' dinner and vice-presidential address by J. Gordon Carlson, "Some Observations on Mitotic Movements of Chromosomes". *Dec. 29, eve.* Contributed papers, *Dec. 26, p.m.; 27, a.m.; 30, a.m.; p.m.*

American Society of Parasitologists

Contributed papers, *Dec. 28, 29, 30, a.m., p.m.* Parasitologists' luncheon, business meeting, demonstrations, *Dec. 29, p.m.*

Herpetologists League

Symposium, cosponsored by the National Speleological Society: "Distribution and Speciation of Cave Vertebrates," *Dec. 27, p.m.* Contributed papers, *Dec. 29, a.m., p.m.*

Society of Systematic Zoology

Contributed papers, *Dec. 27, 28, 29, 30, a.m.;* Lecture, *Dec. 29, eve.;* Lounge and display of zoological library, *Dec. 26-31.*

Association of Southeastern Biologists

Symposium, joint with Sections F and G, cosponsored by Amer. Soc. of Naturalists, Amer. Soc. of Parasitologists, Genetics Society of America and Society of Systematic Zoology: "The Species Problem," *Dec. 28, 29, p.m.* Breakfast, *Dec. 28, a.m.*

Ecological Society of America

Contributed papers, joint with Sections F and G; Field trip to Stone Mountain, *Dec. 27, a.m.*

National Association of Biology Teachers

Symposium, joint with American Nature Study Society and National Science Teachers Association: "Southern Agriculture from 1913-1956," *Dec. 27, a.m.* Panel, *Dec. 27, p.m.;* Joint sessions with ANSS and NSTA, *Dec. 28, a.m.;* Joint sessions with National Association for Research in Science Teaching, *Dec. 28, p.m.;* Panel, *Dec. 29, p.m.;* Joint Field Trip with ANSS to Stone Mountain, *Dec. 30.*

Society of General Physiologists

Symposium, cosponsored by Sections F and G and Assoc. of Southeastern Biologists: "Applications of Serology in Biological Research," *Dec. 28, a.m.*

Section G—Botanical Sciences

Symposium, cosponsored by Section O and the American Phytopathological Society: "The Tobacco Plant," *Dec. 27, a.m.* Symposium, cosponsored by Section O and the American Phytopathological Society: "The Cotton Plant," *Dec. 27, p.m.* Contributed papers in general botany, joint with Botanical Society of America, Southeastern Section; in plant ecology, joint with Ecological Society of America; and in plant physiology, joint with American Society of Plant Physiologists, Southern Section, *Dec. 28, a.m. and Dec. 30, a.m.* Botanists' Dinner and vice-presidential address by L. R. Blinks, "Flora et Fauna Potomacensis," *Dec. 28, eve.*

American Phytopathological Society

Symposium: "Plant Pathologists Can Use TV," *Dec. 28, eve.* Phytopathologists' Banquet, *Dec. 29, eve.* Concurrent sessions for contributed papers, *Dec. 28, 29, 30, a.m., p.m., eve.*

American Society of Plant Physiologists, Southern Section

Symposium, cosponsored by Section G: "Physiology of Marine Algae," *Dec. 30, a.m.*

Section I and American Physiological Society

Invited papers: "Sensory Processes," *Dec. 28, a.m.;* "Brain and Behavior," *Dec. 28, p.m.;* "Primate Behavior," *Dec. 29, p.m.*

Section N—Medical Sciences

Symposium: "Microbiology and Medical Research." I. Nutrition Microorganisms, *Dec. 27, a.m.* II. Metabolic Aspects of Medical Microbiology, *Dec. 27, p.m.* III. Radiation Effects in Microbiology, *Dec. 28, a.m.* IV. Infection and Chemotherapy; Announcements of Theobald Smith and Anne Frankel Rosenthal Awards; vice-presidential address by S. E. Luria, *Dec. 28, p.m.*

American Psychiatric Association

Symposium, cosponsored by Section N and the American Physiological Society: "Physiological Bases in Psychiatry." I. New Psychopharmacologic Agents, *Dec. 27, a.m.* II. Mechanisms of Actions in New Agents, *Dec. 27, p.m.* III. Effects of Alcohol on Brain Respiration and Metabolism, *Dec. 28, a.m.* IV. Alcohol Addiction, *Dec. 28, p.m.*

General Events

AAAS Presidential Address by Warren Weaver and Reception. *Dec. 28, eve.* Biologists' Smoker, *Dec. 29, 8:30-11:00 p.m.*

Conference on Scientific Editorial Problems, *Dec. 27, 28, a.m. and p.m.*

AAAS Annual Exposition of Science and Industry and the AAAS Science Theatre, both *Dec. 27-30 inclusive.*

Coupons for sleeping accommodations and for advance registration will be found in *Science* and *The Scientific Monthly.*

What Is a Gene?

G. W. BEADLE

California Institute of Technology

Condensation of AIBS General Lecture delivered at Michigan State University, September 6, 1955

A SERIES of recent developments in biology and chemistry has greatly increased our understanding of the structure, function, replication and mutation of genetic material.

Beginning with the work of Avery and his collaborators on pneumococcal transforming principles, evidence that the primary genetic information is carried in the form of desoxyribonucleic acid (DNA) has become quite strong.

The most compelling of the several arguments for assigning this important role to DNA comes from the experiments of Hershey and co-workers (Cold Spring Harbor Symp. Quant. Biol. 18: 135, 1953) with bacterial viruses in which the protein coat is labelled with sulfur-35 or the DNA core labelled with phosphorous-32. The course followed by these radioactive tracers through the virus life cycle indicates that only the DNA enters the host cell. Since genetic studies show quite clearly that the virus has linearly arranged hereditary material that behaves in several respects like that of higher organisms, the indicated conclusion is that this material in the virus must consist solely of DNA.

Perhaps of greater significance to biology than any advance of recent decades is the proposal of a specific structure of DNA by Watson and Crick. (Cold Spring Harbor Symp. Quant. Biol. 18: 123, 1953.) This structure, which consists essentially of a pair of complementary polynucleotide chains hydrogen bonded together through purine and pyrimidine bases, provides a basis for genetic specificity in the order of base-pairs along the molecule. Separation of the complementary chains, followed by directed synthesis of new complementary partners by the single chains, is presumed to be the basis of replication of the genetic material. Mistakes in nucleotide sequence, made during replication, provide one plausible basis for gene mutation.

It has been suggested that gene function involves a transfer of DNA information or specificity to ribonucleic acid (RNA) and thence to such macromolecules as proteins. Since no structure of RNA comparable in plausibility to the Watson-Crick DNA structure has been proposed, the nature of the transfer of DNA specificity to RNA remains a key problem. In the same sense, the precise way in which RNA directs the synthesis of specific proteins remains to be discovered. One possibility that has several times been suggested is that segments of RNA serve as templates against which protein molecules are constructed from their constituent amino acids.

Using the Zinder-Lederberg technique of transduction in *Salmonella* (transfer of small chromosome segments from one bacterial cell to another by means of a virus capable of being carried in a latent form in the recipient cell), Demerec and his associates (Proc. Nat. Acad. Sci. 41: 359, 1955) have developed what appears to be a powerful method for investigating the fine structure of the gene.

Defining functional units of the genetic material of this bacterium both in terms of their control of single chemical reactions and by their genetically determined positions, it is found that for each such unit mutant changes are possible that can be shown to be nonidentical (often complementary) in cross-transduction tests. In terms of the Watson-Crick structure these are presumed to consist in substitutions, deletions or rearrangements of base-pairs at various positions along the functional unit.

Using a special technique for detecting rare recombinations, Benzer (Proc. Nat. Acad. Sci. 41: 344, 1955) has presented evidence for the existence of similar functional units in bacterial viruses. Again mutational changes of independent origins within a single such unit are often recombinable in "crosses."

It is not yet clear what the relation of these results is to the so-called pseudoalleles of higher forms (Lewis, Amer. Nat. 89: 73, 1955). Neither can it be said with certainty how they are related to the remarkable phenomenon reported by M. B. Mitchell in *Neurospora* (Proc. Nat. Acad. Sci. 41: 215, 1955) in which there appears to be rare transfer of a limited amount of genetic material from one chromosome to its homolog without conventional crossing over.

In higher plants and animals, in which the chromosomes are several orders of magnitude larger in cross-sectional area than are the DNA strands of bacterial viruses, Mazia (Proc. Nat. Acad. Sci. 40: 521, 1954) presents evidence indicating that the chromosomes are made up of DNA-protein segments about 4000 Å long bound together end-to-end by divalent calcium and magnesium ion bridges. It is possible that these units consist of bundles of identical DNA segments, somehow combined with protein, that correspond to the functional units of genetics. If the breaks of crossing over occur only between such segments, they would also correspond to the genetic units of recombination. But such a structure does not exclude the possibility that crossing over is sometimes or even always intragenic.

Despite these many important unanswered questions, the main lines of evidence suggest, or are consistent with, the following hypothesis:

Segments of DNA of perhaps several hundred nucleotides make up the primary functional genetic units. In bacterial viruses these appear to be transferred to the host without accompanying protein. In higher forms, on the other hand, there is no convincing evidence that they ever become separated from protein. Genetic specificity (information) is dependent on proportions and sequences of base pairs in these DNA segments. In gene mutation base-pair proportions and sequences are altered by substitution, deletion or rearrangement. Replication of genes is accomplished by separation of complementary nucleotide chains followed by synthesis of complementary daughter chains. Functional units of DNA in some manner transfer specificity to RNA units which in turn serve as templates in protein synthesis.

It is conceivable that the transfers of information from DNA to RNA and from RNA to protein are under some circumstances reversible processes. Such reversibility would allow for the storage of genetic information in the form of RNA in those viruses that appear to contain no DNA. Since such viruses replicate their genetic information only in a host cell containing DNA and protein, it is not necessary to assume that RNA is self-replicating in the same sense in which DNA is postulated to accomplish this remarkable feat.

On this hypothesis, what is a gene? Is it a functional unit carrying the information necessary for the synthesis of a specific macromolecule? Or is it the unit of recombination? If it is the latter, the evidence from viruses and bacteria suggest that the ultimate unit might well be a single nucleotide. If it were necessary to define a gene without additional information, the choice would have to be an arbitrary one. It may well be that the time is near for a reconsideration of terminology. Until then it is particularly important to make perfectly clear in particular cases just what one has in mind when such terms as *gene*, *locus*, and *allele* are used.

Comments on the Use of Statistics

ROBERT L. STEARMAN

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RECENT years have seen an increase in the use of statistical methods in most of the scientific fields. The literature of these fields now has articles reporting statistical analyses of many types of experiments. I, as a statistician, would like to believe that the recent popularity of these tools has been due solely to a need for these tools, felt by research workers. I have to admit, however, that the upsurge is, at least in part, the result of a current fad in this direction. Of course I'm glad to see my fellow scientists use statistical methodology whether it is the result of a fad or the result of a heartfelt need.

When a great many people start using some tool, it is inevitable that part of the usage will be improper. The tool may be used where it is not needed, and may be forgotten when its use would be helpful. I think it might be well to pause for a moment to examine some of the aspects of the use of statistical methods. This paper contains some comments and suggestions on when and how they should be used in research experimentation. I should stress the fact that the ideas expressed here do not necessarily represent the views of all statisticians. They are, however, what I would consider a practical approach to the field.

Should You Use Statistics?

Some research workers don't use any statistical tests whatsoever. In fact, they will tell you that they have no need for them. Others have a tendency to examine every bit of data they obtain. They make no decisions nor do they publish results without a full regalia of statistics. The attitude of these people seems to be that unless a statement is backed up by statistics, you can't believe it. I can't agree with either of these points of view. There are some experimental problems in which there is a definite need for the application of statistical techniques for full evaluation of the data. On the other hand, there is no need to apply them to everything. What is needed is a compromise between the two attitudes: use the tests when they are needed and forget them if they are not. The question that arises, of course, is when are they needed?

When Should They Be Used?

Some types of problems make application of statistical methodology almost essential. An example would be the determination of median lethal dose or median protective dose. Another problem which utilizes statistical methods to great advantage is the determination of the Most Probable Number (MPN) in estimating the number of organisms suspended in a liquid medium. In these problems, the methods used take advantage of all of the information the experimental results have to offer in making an estimate. Statistical techniques can also be helpful in other problems of estimation. If there is need to estimate the amount of variation in some procedure, or to estimate the average results of some treatment, statistical methods offer a way of obaining numerical answers with some degree of precision.

At times, differences between observed and expected results may be of a size which has no practical importance. Thus, a study of the difference between two procedures may give sample averages which are not far enough apart to be of practical value. In this event, there is no need for a statistical test. Don't waste your time testing anything you wouldn't use later on.

At other times, differences between expected and observed results may be such that the meaning is obvious. Thus, there might be an obvious difference between two treatments. Here, again, there is no need to test such a difference. Statistics is no substitute for sound professional judgment. The judgment must, of course, be sound. Examination of averages without consideration of precision of the measurements is not sound. At any time when a reasonable doubt exists as to the obvious qualities of the results of an experiment, statistical methods are there to help. These techniques offer a common basis for the evaluation of experimental results.

How Should They Be Used?

Some workers seem to have the mistaken idea that statistical procedures are a wonder tool. Actually, they are nothing of the sort. Statistical methodology is the application of logic to experimental data, formalized by applied mathematics. They give logical results if the application is proper. Every procedure should be used with a little common sense and a statistical procedure is no exception. Statistical techniques offer no substitute for good experimental technique. You can't squeeze good results out of a badly run experiment with these tools, since the statistical results are no better than the technique used in running the experiment.

Common sense should also be used in the choice of statistical methods used. Approximate statistical techniques are available for many of the common problems. Whether these or more exact methods should be used depends on the source of the data and the use to which the results are to be put. There is no need to waste refined techniques on crude data. At times, the measuring device or procedure which is available is quite imprecise. When this occurs it is usually beyond the control of the research worker. In this event, there is no need for more refined methods of analysis when the cruder ones are of sufficient precision to match the precision of the observations. Approximate methods can also be applied when approximate answers are all that is needed. Thus, if a preliminary estimate of a median lethal dose is needed to set up an experiment in which smaller intervals will be used between successive dose levels, there is no need to run through the complete probit analysis with iterations. The graphical probit or one of the other approximate methods will serve the purpose very well.

A fallacy which sometimes crops out when the question of the use of statistical methods arises is that large samples must be obtained before statistical techniques can be applied. Actually, modern statistical techniques were developed primarily for use with small samples. The size of sample needed is partly dependent on the precision of the observations. When working with an imprecise measuring device, larger samples will be needed than would be required with more precise equipment. The size of sample also depends on the size of discrepancy you wish to be able to detect between observed and expected results. When testing for a difference in average results between two procedures, the finer the difference to be detected, the larger the sample required. Too large a sample can be a waste of time. If the size of sample is too large, the power of the test will be such that even differences of a size which is of no practical importance can be detected with the test to be used. Of course, if the sample is too small, differences which would be of practical value may be rejected.

Do You Need a Statistician?

Many of the leading universities and colleges are now offering elementary courses in statistics for students at the graduate level. These courses are usually designed to acquaint the student with the field and to give a working knowledge of most of the ele-

mentary tests and experimental designs. Thus, many of the research workers now being trained can run their own tests when dealing with many of the usual designs, without the aid of a statistician. There are times, though, when a statistician is a handy person to have around.

There are a great many experimental designs now available, and more are being added almost daily. The statistician may well have a design for your particular problem which is far more efficient than the one which you intended to use. He may also have a method of analysis which will get more information from your data. It is well to consult him on the problem of designing and analyzing of your experiments. There are many designs which look much alike but which require different methods of analysis. Things are not always what they seem, and this is especially true in statistics.

If you are going to use a statistician, there is one time when he will be of special advantage to you and that is in the planning stage of your experiment. All too often the statistician is not consulted until after the data have been gathered and then he finds that there is nothing that he can do with the results or that the analysis of the data may be entirely too expensive and time consuming because of the lack of appropriate design. The elementary classes in statistics usually try to stress the point of consulting the statistician in the planning stage of the experiment.

Summary

I think that if one sentence could be used to summarize what I have said, it would be: Common sense is the best approach to the use of statistical tools. They are no wonder tool nor are they something to be feared. They are almost essential in some problems but need not be used on every set of data. If results of the experiment are obvious or if the differences observed are not of a size to be of practical importance, don't waste your time analyzing the data.

Statistical techniques are no substitute for good experimental technique nor are they a substitute for sound professional judgment. When statistical procedures are to be used, the methods applied should depend on the source of the data and the use to which the results are to be put.

You probably won't need a statistician when dealing with the elementary designs in experiments, however, if you need one, it is to your advantage to consult him in the planning stage of your work and not after the experiment is completed.

The Committee on Educational Policies

Division of Biology and Agriculture, National Research Council

RICHARD E. PAULSON, *Executive Secretary*

DURING the last few years biologists have become increasingly concerned over the state of affairs in biological education. A host of problems, some peculiar to the life sciences, others shared by all the sciences or by the whole field of educational endeavor, urge biologists to undertake a deeper search for guiding principles and greater effort to improve teaching practice. Problems in the forefront—to cite only a few—include the accelerating growth and diversification of the biological sciences, the need for continuing reappraisal of fundamental concepts, the increasing demand for specialists—but specialists with broad knowledge and outlook, the expanding significance of science in human affairs, the concomitant need for public understanding and support of science. Literally hundreds of problems could be listed, all interwoven in complex ways.

These challenges have already evoked many publications, conferences, and experiments. Recommendations have been advanced by the hundred; all sorts of surveys, experiences and ideas have been published. This activity reflects a most encouraging willingness to reexamine, evaluate and modify educational programs. Nonetheless there is yet no systematic, coordinated campaign of the kind required to raise significantly the probability of high yield from the necessarily limited resources of manpower, money, energy and facilities which can be devoted to biological education. The medical profession, forestry, chemistry, and other disciplines have for many years demonstrated the value of concerted educational planning and programming. A parallel biology-wide effort is called for to insure the quality of the oncoming generation of biologists and improved instruction in all specialties and at all academic levels.

In 1953 Dr. Paul Weiss, when Chairman of the NRC Division of Biology and Agriculture, convened a Conference on Biological Education to advise the Division on how it might help biologists meet the issue. The Conference underscored the need, in view of the rapid development of the biological sciences, for continuing study of educational policies and practices, and recommended establishment of a policy committee to advise all those concerned with the many aspects of biological education as to present and future requirements of and obligations upon the biological sciences.

The Committee on Educational Policies was therefore formed in 1954. Its function is to study needs and problems in the education of prospective biologists and the teaching of biological sciences, to review and evaluate proposed solutions, to help formulate sound guiding principles, and to aid organizations and faculties in designing promising programs. In carrying out its assignment the Committee relies upon contributions from many biologists, as well as from other fields. Some work can be done by subcommittees and task forces, but many projects will be more appropriately the province of professional societies and other groups. The Committee's role is deliberative, coordinative and catalytic: to stimulate and to facilitate improved interchange of information and ideas, more effective cooperation, and augmented creative effort in education by the whole biological fraternity.

The Committee now includes eight members, each also heading a subcommittee working in a particular area. Members for 1955-6 are: H. M. Phillips, Emory University (Chairman); C. S. Chadwick, Peabody College (Precollege Education); Thomas S. Hall, Washington University (College Education); T. S. Painter, University of Texas (Graduate and Professional Education); Clyde E. Bailey, University of Minnesota (Applied Biology and Technical Specialists); Milton O. Lee, Federation of American Societies for Experimental Biology; John A. Behnke, American Association for the Advancement of Science (Publications; Adult Education). A member is being appointed to represent Premedical Education and Health Sciences.

The Committee has also profited greatly from the services of past members, including: E. Laurence Palmer, Cornell University; John A. Hannah, Michigan State University; Donal Sheehan, New York University; E. C. Young, Purdue University; and Harriet Creighton, Wellesley College. Grateful acknowledgment is also due those who have served on subcommittees, all who have given thought and time to answering requests for information and opinions, and many other contributors to the Committee's work.

As part of the National Research Council, the Committee can help plan the coordination of educational activity with other aspects of biological endeavor and with programs bearing upon all sciences. The Committee is a unit of the Biology Council, which is concerned with a wide range of problems of basic concern to the biological sciences. And, through the NRC, the Committee can develop working liaison with government, industry, business, educational organizations, academic institutions, professional societies, publishers, and all other groups involved in biological education.

The Committee presented its first public report on September 6 in a symposium at the AIBS East Lansing meetings. It plans to publish that account as an initial interim report. While space here permits only a bare list, without discussion of rationale and background, of Committee activities, the following items indicate some of the directions in which the Committee is moving:

1) Preparation of a comprehensive review and the compilation of abstracts of the massive literature relevant to biological education. For use in this project, the Committee would welcome reprints of articles and conference reports, summaries of conferences and symposia which did not produce reports, and other literature.

2) Fact-finding studies on precollege biology teaching; participation in conferences and pilot programs aimed at improving high school science instruction; efforts to help biologists undertake realistic and promising programs of cooperation with schools in their own communities.

3) Conferences for thorough reappraisal of undergraduate curricula in basic and applied fields; development of outlines of the modern content of certain subjects by boards of experts, for the guidance of those designing courses and textbooks.

4) Efforts to improve preparation of graduate students for college teaching, through better use of teaching fellowships, seminars, and postdoctoral internships.

5) Efforts to assist college teachers to keep near the frontier of biological advances and educational experimentation through institutes, literature, study and research opportunities, promotion of new departures in education, and visiting professorships.

6) Preparation of a series of sourcebooks of challenging laboratory and field work for high school biology, introductory college courses, and advanced undergraduate courses in a number of basic fields. Additional projects aim at the improvement of textbooks, audiovisual aids and their use, and other instructional resources.

7) Development of a systematic series of film-lectures at college and perhaps high school levels, designed to bring distinguished biologists to more students and to free instructors for greater attention to laboratory, discussions, tutorials and similar individualized teaching.

8) Survey of adult education in biological sciences (information on existing programs will be much appreciated) and expansion of new and effective programs.

9) Promotion of summer and short-vacation apprenticeship institutes to give high school and college students concentrated experiences in biology in research environments.

The Committee's work has, of course, barely begun. And it must be emphasized and re-emphasized that the advancement of biology through better education is a job that will require long-range creative, cooperative and energetic effort by all biologists. The Committee's role is to help find ways to achieve a high coefficient of effectiveness.

Michigan State University Meetings

THE enormous campus of Michigan State University played host to 3000 biologists from September 5 to 9, 1955. The AIBS-sponsored meeting of biological societies was planned as part of the year-long Centennial celebration of the University. Members of 24 societies gathered to read papers, present symposia and take part in field trips throughout the state of Michigan. 1145 papers were listed in the General Program and 134 biologists took part in symposia. All but four states were represented by speakers. New York led in number of speakers with 286, followed by Michigan with 184 and California with 154. 23 states contributed 20 or more speakers.

The following societies held sessions: American Bryological Society, American Fern Society, American Microscopial Society, American Society for Horticultural Science, American Society of Human Genetics, American Society of Limnology and Oceanography, American Society of Naturalists, American Society of Plant Physiologists, American Society of Plant Taxonomists, American Society of Zoologists, Beta Beta Beta, Biometric Society (ENAR), Botanical Society of America, Ecological Society of America, Genetics Society of America, Mycological Society of America, National Association of Biology Teachers, Nature Conservancy, Phycological Society of America, Potato Association of America, Society for Industrial Microbiology, Society of Protozoologists, Society for the Study of Evolution, Society of Systematic Zoology and the Animal Welfare Institute.

One of the highlights of the meeting was the general address delivered September 6 by George W. Beadle of the California Institute of Technology on "What is a Gene?" Dr. Beadle traced the recent discoveries in biology and chemistry that have increased our knowledge of gene structure and discussed the hypotheses that now quite plausibly explain the structure, function, duplication and mutation of genetic material. A special symposium, "The Taxonomy of Cultivated Plants", was organized by six societies and dedicated to Liberty Hyde Bailey. Another symposium, "Sewall Wright's Contributions to Population Genetics", was in honor of one of America's outstanding geneticists.

Other prominent symposia included: "Antibiotics in Agriculture" by the Society for Industrial Microbiology; the Annual Symposium of the American Society of Naturalists, "Modern Approaches to Problems of Differentiation"; the Presidential Symposium of the American Society of Zoologists, "Problems of Morphogenesis"; "Arctic and Alpine Tundras" of the Ecological Society of America; the American Society of Plant Physiologists' "Respiration in Plants"; "Microscopical Science in Aquatic Biology" of the American Microscopical Society; and the American Society of Limnology and Oceanography's "Primary Production in Waters".

The AIBS Placement Service, which was active throughout the convention period, registered 136 biologists and arranged interviews for 41 prospective employers. This Service is becoming better known and better utilized by both young biologists wishing assistance in locating suitable positions and employers seeking qualified personnel.

A fine group of science writers covered the meetings for their papers, wire services and magazines and enthusiastic national coverage was given to scores of papers presented during the four days.

The Biological Sciences Exhibit Hall, now an integral part of AIBS Meetings, was larger than usual at East Lansing and one of the most popular places on the campus. 31 organizations occupied booths. Publishing houses represented were: C. V. Mosby Company, Macmillan Company, Burgess Publishing Company, Wm. C. Brown Company, W. B. Saunders Company, John Wiley & Sons, McGraw-Hill Book Company, Harper & Brothers, Association of American University Presses, and Prentice-Hall. Manufacturers of laboratory equipment and biological supplies

were: Carolina Biological Supply Company, American Tobacco Company Research Laboratory, Davison Chemical Company, Heinicke Instruments, American Optical Company Instrument Division, John Bean Division of the Food Machinery and Chemical Corporation, Climax Molybdenum Company, Graf-Apsco Company, Chicago Apparatus Company, Michigan Scientific Company, Bausch and Lomb Optical Company, Rayoscope Company, National Spectrographic Sales Corporation, Eberbach Corporation, Ward's Natural Science Establishment, Inc., Nuclear Instrument and Chemical Corporation (Nuclear Chicago) and C. A. Brinkman and Company. Non-commercial exhibits included: American Veterinary Medical Association, the Chemical Biological Coordination Center and Michigan State University Agricultural Extension Service.

Brief summaries of a few of the more interesting or significant papers presented by members of various societies follow.

Two McGill University scientists, C. M. Wilson and I. K. Ross, presented cytological proof of meiosis in myxomycetes. The reduction divisions of chromosomes was found to take place during the formation of the sporangia. J. K. G. Silvey, North Texas State College, on cultivating aquatic actinomycetes on artificial media, discovered that these organisms produced many of the tastes and odors commonly attributed to algae blooms. Further investigation showed that these actinomycetes grew on algae, higher aquatic plants, organic debris, and in a wide variety of stream and lake habitats. Dr. Silvey claims that the actinomycetes are responsible for fishy, marshy, potato-bin, woody, musty, earthy and manurial smells and tastes in water. Their presence in drinking water can be of considerable economic importance and, therefore, deserving of prompt control research.

Useful applications of wood-rotting basidiomycetes were outlined by M. W. Jennison, Syracuse University. It has been found that many species can be grown under controlled conditions in aerated liquid culture, utilizing such cheap waste materials as spent brewers' grains, sulphite waste liquor, cannery wastes, food-processing wastes, molasses fermentation residues and corncobs. Fermentation products are chiefly organic acids. In addition to using such fungi for disposing of plant wastes, and for the production of useful fermentation products, the resulting mycelium itself may be valuable as an animal-feed supplement. Mycelium was found to contain 35% protein and some 18 amino acids, including the ten essential in animal nutrition.

Following the discovery in 1950 that crude extracts of dehydrated *Boletus edulis* retarded the growth of implanted mouse tumors, E. G. Lucas and J. A. Stevens of Michigan State University, in collaboration with the Sloan-Kettering Institute, have tested a wide range of other basidiomycetes. The following genera were found to contain tumor-retarding properties: *Boletus, Calvatia, Clitopilus, Collybia, Cortinellus, Hydnum, Leiota* and *Polyporus*.

The role of hybrids in agricultural advance has grown in importance in recent years. Bees have now joined the ranks. G. H. Cale of Dadant and Sons and J. W. Gowen, Iowa State College, analyzed the results of controlled hybridity on egg and honey production. It was found that productivity increased 135% for eggs and 116% for honey and that the hybrids were larger by 117-124% than random country-wide stock. More worker bees, of greater vigor and honey gathering capacity, are now possible.

A new method for separating the proteins of human blood serum has been devised by O. Smithies and N. F. Walker of the University of Toronto. Individual variations were found to exist and to fall into three groups, I, II-A and II-B. Family studies have shown that the serum protein groups are inherited but that they are not correlated with the well-known blood groups, A, B, AB and O. This information may prove useful in medico-legal cases of disputed parentage.

True genetic females can now be dispensed with in toads, according to a report by E. Witschi and C. U. Chang, State University of Iowa. Using the clawed toad, *Xenopus*, that is commonly utilized in pregnancy tests, Drs. Witschi and Chang found that male embryos placed under the influence of estradiol developed into egg producing behavioristic females. Their male hereditary constitution remained unchanged, however, because the eggs they laid, when fertilized by a normal male, produced only males. The estradiol was added to the aquarium water and one week's treatment was sufficient.

A cytological form of inheritance in *Chlamydomonas* was reported by Ruth Sager of the Rockefeller Institute for Medical Research. One in a million *Chlamydomonas* cells was found to be resistant to large doses of streptomycin. When such streptomycin-resistant cells were mated sexually with streptomycin-sensitive cells, all offspring were found to be streptomycin-resistant. Further study showed that the hereditary factor was a particle in the cytoplasm and the chemical identification of these particles is now being investigated.

C. E. Wildon and C. L. Hamner of Michigan State University reported that *Tiba*, 2-3-5-triodo-benzoic acid, hastens flowering in certain floricultural crops. Petunia and zinnias treated with the compound flowered 10-20 days ahead of untreated plants. So far, pineapple is the only commercial crop where *Tiba* has been utilized. Pineapple growers are now able to regulate the harvesting date, thereby making better use of labor and machine canners.

Chemical defoliation of plants has been practiced for several years now. R. H. Biggs and A. C. Leopold, Purdue University, have been able to bring about complete abscission of leaf petioles with auxin concentrations 100-10,000 times more dilute than solutions of other chemicals. A correlation was found, however, between the age of the leaves and the success of the auxin defoliating reaction.

Leaf analysis has developed rapidly in recent years as a means of evaluating the nutritive needs of plants and the effectiveness of various types of fertilizers. A. L. Kenworthy reported on a leaf analysis service, recently established in Michigan, that is one of the first in the country.

The use of maleic hydrazide to inhibit the growth of strawberry runner was reported by C. W. Hitz and M. S. Brown of the University of Delaware. When applied late in the growing season fruiting was not inhibited by the chemical.

Fresh asparagus may soon be available for a longer period each year. Normally only harvested for eight weeks in the spring, it has now been shown by E. P. Brasher, University of Delaware, that plantings can be harvested for four weeks in the spring and another four weeks in the fall without reducing yields.

The pilot-plant process for making a new kind of dehydrated mashed potato was reviewed by a team of U.S.D.A. chemical engineers, M. J. Willard, Jr., J. Cording, Jr., R. K. Eskew, P. W. Edwards and J. F. Sullivan. The new product is called "Potato Flakes" and eastern potato varieties, hitherto found unsuitable, may be utilized.

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The University of Miami Marine Laboratory

ROBERT M. INGLE

IN 1930, the University of Miami inaugurated an elementary course in Marine Biology as part of the Department of Zoology. In time this course became a well-established and valuable part of the biological training program of the University and was the forerunner of the curriculum of the Marine Laboratory, which now covers the entire field of marine science.

In 1940, the University brought from the Bahamas, Dr. F. G. Walton Smith, a marine scientist who had trained at the Plymouth Marine Laboratory, and who had worked previously in the United States on a Guggenheim Fellowship. He began at once to assemble personnel and equipment for the establishment of a Marine Laboratory. Two years later, in 1942, the laboratory was formally dedicated.

Today, with a budget of approximately $350,000 a year, a professional staff of 46 persons, and 3 main buildings, the Laboratory carries on research in all phases of marine science. In addition, an extensive academic program is maintained for students desiring training on the graduate level.

Geographically the most southern part of this country, South Florida, is faunally part of the West Indies, the principal ports of which are readily reached by air from Miami. These tropical conditions, unique among stations in the United States, make it possible to offer training in an aspect of biology which is a valuable part of the education of all botanists and zoologists. The climate permits the study of chemical and physical oceanography and submarine geology under favorable year-round conditions.

The intense competition for food and space on the coral reefs, the enormous variety of species, of adaptations, of feeding habits and of methods of attack and defense, provide a living classroom and workshop for the study of fundamental branches of biology. Furthermore, the physiologist, behaviourist, ecologist, embryologist or biochemist who uses marine animals and plants because of their convenience and not because of an interest in the ocean is immensely benefitted by being able to work at a tropical station where the organisms are active for twelve months every year.

Laboratories are equipped with standard instruments for research in oceanography, fisheries and marine biology. For field work three motor vessels, ranging from 38 to 83 ft., and a seaside laboratory are provided. Nets, dredges, plankton gear, deep sea sampling instruments as well as diving helmets and masks for collecting on coral reefs, are available.

A fleet of mobile laboratories is used for road travel to shore stations throughout the State. X-ray equipment is provided in the Marine Laboratory and an electron microscope and facilities for isotope study are available at the University. There are also shop facilities for instrument design, both electrical and mechanical.

A museum collection of marine fishes, invertebrates and plants of Florida and the West Indies is maintained for reference purposes and is being continually enlarged to meet the needs of research workers and students. A departmental library provides standard oceanographical references and the principal scientific marine journals of the world. More general publications are available in the main library of the University.

The Laboratory staff is engaged in fundamental research in tropical fisheries, marine biology, oceanography and submarine geology and is the official agency for saltwater fisheries research for the Florida State Board of Conservation. Basic and applied research is also conducted on behalf of the U.S. Government, and in cooperation with the Cuban Navy, the Bahamas Government, the National Geographic Society and various other government and industrial organizations. Applied research ranges from game and commercial fisheries development and management to the effects of industrial pollution, the prevention of ship bottom corrosion and fouling, tropical deterioration of electronic equipment and the development of commercial products of marine origin. Fundamental studies in the marine sciences are carried out as part of a balanced program.

The Laboratory in 1948 organized the *Gulf and Caribbean Fisheries Institute*, which meets annually and brings together scientists, state and government officials, and representatives of industry for the purpose of discussing problems and developments connected with the fishing industries of the southeastern United States and the West Indies.

Those wishing to engage in independent research as visiting investigators should communicate with the Director, stating the nature of the proposed investigations. Only a limited amount of space is available and it is therefore necessary to restrict the number of visitors.

At present, investigations are being carried out on the following projects: Marine Biological Research (Florida State Board of Conservation); Shrimp Research (commercial); Shellfish Investigation; Scattering Layer-Ambient Noise; Blue Fin Tuna; Tropical Oceanography; Antifouling Paints; Carbonate Sediments; Organic Productivity of the Ocean; Planktonic Pigments; Pollution of Biscayne Bay; Survey—Water Release—Lake Okeechobee; Bottom Muds—Mobile Bay, Alabama; Shrimp Research (life history); Pelagic Fish Larvae; Nutrition of Marine Algae; Marine Borers (Shipworms and Limnoria; 2 projects); Pacific Billfish (West coast, South America; 2 projects); Red Tide Investigations (hydrographic and biological); Bactericidal Agents in Fish Preservations; Copepod Behavior; Cuban Shrimp Studies.

The results of investigations are reported in the principal scientific journals of the world and also in the *Bulletin of Marine Science of the Gulf and Caribbean* and in the *Annual Proceedings of the Gulf and Caribbean Fisheries Institute*, published by the Laboratory.

The increasing demand for specialized, integrated training in marine sciences has led to the establishment, in connection with the Marine Laboratory, of a Department of Marine Sciences, which offers curricula in fisheries, marine biology and oceanography, both in the undergraduate and graduate school. The graduate program is one of the most comprehensive offered anywhere in the world and is taught entirely by scientists actively engaged in research.

The training of graduate students in fisheries, marine biology and oceanography is greatly enhanced by the unusual opportunities for practical experience. Students who show research ability and who fulfill the necessary requirements may take part in investigations which are part of the laboratory research program either as graduate fellows or as research assistants. In this way they may, for instance, engage in actual fisheries investigations in Florida and the West Indies or in marine biological and oceanographic work in Gulf of Mexico and Caribbean waters, while studying for higher degrees. The Laboratory encourages applications of qualified people for graduate fellowships and research assistantships.

No undergraduate degree is offered in the Dept. of Marine Sciences, but students should seek the degree of Bachelor of Science with a major in one of the biological or physical sciences. By special arrangements, courses and thesis research taken at the Marine Laboratory may be included as part of the requirements for the Ph.D. degree at other universities.

Master's degrees are offered in the Marine Science Dept. in Fisheries Biology, Marine Biology and Physical and Chemical Oceanography. In all, twenty-eight graduate courses are available to advanced students.

In November 1954 construction of a second seaside laboratory was begun. It is located, with the first, on Virginia Key, Biscayne Bay, Miami. It will provide additional laboratory and teaching space and equipment, and will greatly increase the present facilities of the Laboratory.

The University of Texas Institute of Marine Science

GORDON GUNTER, *Director*

THE Institute of Marine Science was established as a separate department of the University in 1944 under the directorship of Dr. E. J. Lund, Professor of Physiology. His interest and efforts for many years led to the acquisition of a site. The first full time worker on the coast joined the staff in 1945. An initial gift of $25,000 from the General Education Board and appropriations by the University permitted construction of the original buildings. However, construction had to be held in abeyance during the war years and did not take place until 1947. At that time the personnel was considerably increased through the award of a grant by the Texas A & M Research Foundation for research on oyster physiology. This work came to an end in 1949 and most of the staff left the University. Since then the staff has gradually built up again until at present there are seven permanent members, four of them listed as Research Scientists. Financial support is from the University.

The Institute was originally planned to be flexible and encompass, as the need arose, any field of marine science. However, since the chief interest in the beginning was exhibited by zoologists, most of the work done at the Institute has been along zoological lines. A general description of the environment and organisms of the Texas coast was one of the first tasks for biologists. Considerable exploration, life history work and field studies have emanated from this station and such work is still in progress. In its broader aspects the research has been related to marine ecology, hydrography, fisheries and oyster biology.

The Gulf of Mexico presents many geological problems. It is fortunate that the workers in this field can begin with the background of the Gulf coastal plain, which has been more intensively studied geologically than any other part of the earth. A geologist has recently been added to the Institute staff and it falls within his province to develop the marine geological program, which in time will include graduate teaching and research. The Institute in past years has become a center of interest in the rather diverse fields of marine zoology. This work will be integrated with marine geology in the future. Due to the fact that the Texas A & M Department of Oceanography has emphasized physical oceanography and meteorology, it is not expected that work in these fields will be stressed at the Institute, at least not in the near future.

Publications of the Institute of Marine Science appears annually and is devoted chiefly to long papers concerned with the Gulf of Mexico and is primarily, but not entirely, given over to papers written by staff members or visiting investigators. A hundred papers, exclusive of abstracts and reviews, have been published by staff members in the *Publications* and elsewhere. Exchange of publications is now maintained with 150 institutions, chiefly marine stations scattered over the world.

In addition to its research activity the Institute has a teaching program. It is not planned to set up a separate degree-conferring department but rather to integrate teaching with the older, established science departments of the main University, thereby supplementing and broadening their activities. So far, the pattern has only been set with the Department of Zoology.

Courses in marine invertebrate zoology, marine vertebrate zoology, and fisheries biology are given to advanced students in zoology. In addition, problem courses and master's and doctor's theses in zoology may be taken at the seashore. The Department of Zoology requires all Ph.D. candidates to take at least one course at a marine station. It is not obligatory that these students visit the University's own station, but probably most of them will. Thus, teaching at the Institute may be divided roughly into two parts; the first being designed for general education of the professional zoologists, and the second being concerned with specific training of zoologists who expect to go into the marine field. It is expected that teaching in marine geology will be similarly integrated with the Department of Geology and that other fields, such as marine bacteriology and marine botany, will be included under similar arrangements at some later date.

The Institute of Marine Science is on Mustang Island and must be reached by ferry. The University of Texas owns 11.6 acres at the inner end of the south jetties of Aransas Pass, at the northern tip of the Island. It is near a small town, Port Aransas, which is chiefly supported by sports fishing in the summer and duck hunting in the winter. New roads have been built which give easy access to the comparative metropolis of Corpus Christi, twenty-seven miles away.

The location of the Institute was carefully selected with regard to the general marine environment and it is among the best the Gulf coast offers. It lies in the northwest corner of the Gulf on a pass connecting a bay system of several hundred square miles with the sea. The salinity here is higher than at any other station in the U.S., with the exception of some on the Pacific coast and on offshore islands. This means that the numbers of species of the biota are considerably greater than in low salinity waters. This fact gives the location particular advantage over other similar areas. The long sandy beaches and the marine fauna of the Gulf are at the door, while the bay flats and estuarine fauna lie within easy distance in the bays behind. Great concentrations of bird life are found on this section of the coast and it is the location for breeding reserves held by the National Audubon Society. The wintering grounds of the whooping crane lie on the shores of the bays 25 miles to the north. The seasonal movement of fishes and crustaceans, both adult and larval, to and from the bays and Gulf pass the Institute's door, in fact, under the dock laboratory. The rock jetties which line the pass are a very important break in the stretches of sand beach, which extend unbroken for a thousand miles southward. The rocks permit the attachment of a large variety of sessile animals and plants which otherwise would not be available.

Because of the high salinity of the adjacent Gulf, there are numerous snapper banks within a few miles which are more or less covered with coral. These are virtually unexplored. Thus the habitat of the snapper, as well as of the sailfish, mackerel and other pelagic fishes lie closer to land here than on any other part of the northern Gulf coast. Laguna Madre, which receives no stream drainage and is the saltiest body of marine water on earth, lies within 30 miles of the Institute. It has about twice the salinity of sea water and produces more fish than all the remainder of the Texas bay waters, although in number of species the biota is depauperate. All life within it dies when it attains three times the salinity of sea water. This unique environment raises many questions for the marine ecologist, fisheries biologist and physiologist.

Two of the Institute's buildings are used for office-library and lecture room space. They are also, in part, living quarters for investigators. A third building was inherited from the Corps of Engineers, which ceded the site. It has been thoroughly rehabilitated as a student dormitory. A fourth building is a small laboratory on shore, with a darkroom. A dock laboratory is built out into the pass over 18 ft. of water. It has circulating sea water and large water tables. A large platform with a small boat landing is built under this laboratory just above the water. The laboratory boat is a 41 ft. diesel launch. Buildings are set upon pilings designed to keep them above a 16 ft. hurricane tide. No hurricane has struck this supposedly storm-wracked coast for ten years, although some stations on the Atlantic have been damaged twice during that period.

The Institute can sleep sixteen visitors under somewhat crowded conditions and it can carry ten in fair comfort. Quarters and cooking facilities are offered free to students and visiting investigators.

The physical facilities of the Institute of Marine Science are all relatively new. They offer broad opportunity for marine research in a relatively unknown and untrammeled area. Some of the opportunities are unique. Some of this work has been done and it is expected that considerably more will be accomplished in the future.

The University of Oklahoma Biological Station, Lake Texoma

CARL D. RIGGS, *Director*

THE University of Oklahoma Biological Station is a permanent field station designed and operated for study and research in ecology and natural history, and those phases of taxonomy, evolution, morphology, and physiology that require extensive study of organisms in their natural habitats. Annual summer sessions are held in June, July and early August, and research is done throughout the year. The Station was established in 1950 on the north shore of the Red River arm of Lake Texoma, two miles east of Willis, and 14 miles south of Madill, Marshall County, Oklahoma. Lake Texoma is a 93,080 acre impoundment of the Red and Washita Rivers, formed by the Denison Dam, at Denison, Texas.

The biotic province in which Lake Texoma and the surrounding region are located is characterized by tall grass prairies and blackjack-post oak forests. Bottom land and flood plain vegetation are found along many of the tributary streams. Low limestone hills covered with sand, clay, loam, or a mixture of these, often with extensive stone outcrops, are abundant as are plains and valleys with similar soil types. Cultivated fields of various crops, eroded areas in beginning to advanced stages, permanent and intermittent streams, farm ponds, and marginal wet lands all abound in the vicinity.

The fact that this Station is centrally located on a man-made lake (the biology of reservoirs such as Lake Texoma is only slightly known) in an area with a great variety of both aquatic and terrestrial environments where there has been little biological investigation, greatly enhances the research opportunities for both botanical and zoological study. Since Lake Texoma is used primarily for flood control and electrical power production, areas of its shoreline are alternately inundated during periods of high water, and exposed by drawdown. The constantly changing environment created by these water fluctuations offers many interesting and vital ecological problems. The large and diverse fish population and the aquatic birds and mammals offer many vital problems for taxonomists and ecologists as well as a wide and relatively unexploited field for parasitologists. Several large, well-isolated islands (on the largest of these are five small lakes or ponds), each occupied by extensive flora and fauna, including amphibians, reptiles, birds, and mammals, are ideal for population studies.

It is impossible at the present time to list the number of species of plants and animals that occur in the region. Too little is known. Intensive collecting and research in the area began in the summer of 1949 and many species of plants and animals were new records for the county and even for the state. The Biological Station herbarium now contains over 500 species of flowering plants representing 274 genera and 92 families. Additional forms are being added constantly.

The study of animal parasites in the region has revealed many new hosts and distributional records, as well as new species records. It has been possible to make studies of only a few of the many host species available. Since few parasite studies have been made in the state, opportunities for taxonomic, distributional, and life-cycle studies are practically unlimited.

Several thousand insect specimens, representing well over 150 families, have been classified. Numerous inconspicuous forms remain completely unclassified as yet—especially flies, caddisflies, and beetles. No detailed taxonomic work has yet been undertaken. Among the many groups of invertebrates collected, a small beginning has been made toward a study of the spiders, scorpions, crayfish, and molluscs.

Of the vertebrates, 67 species of fishes, 16 of amphibians, 42 of reptiles, 154 of birds, and 32 of mammals, including beaver, armadillo, coyote, and whitetail deer were seen or collected and comprise an excellent beginning for the vertebrate faunal list. Many of these were new records for the area and even for the state.

The physical plant of the Station consists of eighteen buildings; the main building which includes two laboratories and accessory rooms, a photographic dark-room, an aquarium with outdoor and indoor tanks, a kitchen and a dining hall, men's and women's dormitories, a library, and study and work rooms for advanced students; the laboratory building, containing three new laboratories; the faculty apartment building; ten living units for married students and families; the water filtration plant; and the boathouse.

Laboratory equipment includes compound and dissecting microscopes, microtomes, centrifuges, drying and preparation ovens, electrical resistance thermometer, spectrophotometer, pH meter, conductivity bridge, glassware, chemicals, and many other items. Field equipment consists of a launch, boats with outboard motors, cameras, field glasses, collecting equipment, cages and pens, chemistry kits, and other ecological and limnological equipment.

The facilities of the Station are available to independent investigators during the regular sessions, and at all other times during the year. Faculty members of the Station are available for advice and help on research problems, and consultation with all staff members of the departments of Plant Sciences and Zoology, at Norman, may be had by correspondence or personal contact.

Living conditions are adequate and comfortable, although often plain and simple. Students and investigators live in dormitories equipped with running water and electricity. The dormitories for women are divided into two- and three-room units. The one for men is a single large unit. Meals are served cafeteria style in a large dining hall. Board is provided by the commissary and supervised by the Commissary Committee. Lunches are provided for field trips and certain recreational activities.

A general fee covering normal laboratory supplies, library, and regular field trips, must be paid at registration by each student; non-residents must pay an additional fee. There is no reduction in fees for students registering for less than the full program. There is no general fee for independent investigators who do research at the Station providing they supply their own research materials. When materials must be provided by the Station, the cost must be paid by the investigator. Investigators have full access to all privileges and facilities of the Station.

At least four assistantships are available to graduate students each summer at Lake Texoma. These pay the non-resident fee, and a monthly salary, the amount depending on the academic level of the student. Several scholarships of $150 each, provided by the University of Oklahoma Foundation, are available to both undergraduates and graduates each summer at the Station. Both the assistantships and scholarships are awarded on the basis of need, academic record, and recommendations.

Currently, the curriculum of the Biological Station includes 14 formal courses and 7 research courses. Additional courses will be added. The botany courses now offered are: Principals of Plant Ecology, Taxonomy and Ecology of Freshwater Algae, Identification of Vascular Plants, and Ecology of Aquatic Plants; Investigations in Plant Sciences and Research for the Master's Thesis and Research for the Doctor's Thesis are also offered. Staff members teaching botany include: Drs. Geo. J. Goodman and Elroy L. Rice of the Univ. of Okla., and William C. Vinyard of Michigan State College.

Zoology courses offered are: Mammalogy, Herpetology, Natural History of Invertebrates, Natural History of Vertebrates, Field Entomology, Parasitology, Helminthology, Limnology, and Fishery Biology; also, Investigations in Zoology, Advanced Zoology, Research for the Master's Thesis, and Research for the Doctor's Thesis. Staff members teaching zoology are: Drs. J. Teague Self, Geo. M. Sutton, Harley P. Brown, Carl D. Riggs, and Charles C. Carpenter of the University of Oklahoma, Bryan P. Glass of Oklahoma A & M College, and George H. Bick of Tulane University.

Attendance at the Biological Station is a vital part of the education and training of all biology majors, and especially those who do graduate work. Independent investigators, and students who have successfully completed two collegiate laboratory courses in biological sciences may apply for admission. Attendance is restricted to those who apply in advance, and applications are considered until April 10. Those wishing further information should write to: Carl D. Riggs, Director, University of Oklahoma Biological Station, Norman, Oklahoma. Early application is advisable.

The Allan Hancock Foundation for Scientific Research

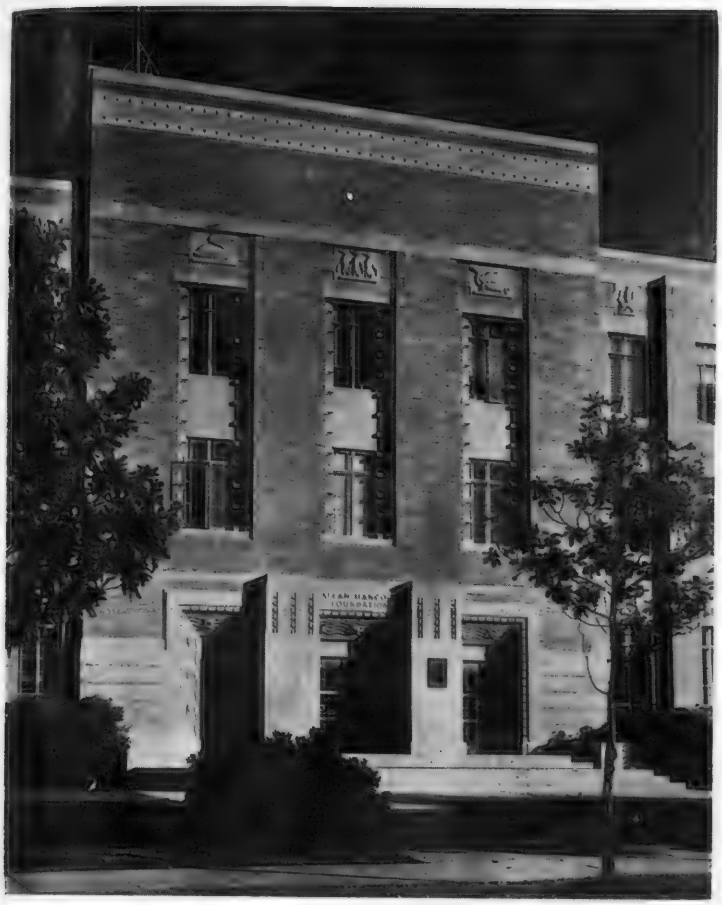
THOMAS CLEMENTS, *Chairman, Committee on Research*

THE Allan Hancock Foundation for Scientific Research was established in 1938 by Capt. Allan Hancock, business man and philantropist of Los Angeles and Santa Maria, California, on the campus of the University of Southern California. Although at one time or another such activities as radio, educational television, and aeronautics have been included in the program of the Foundation, the principal emphasis always has been on marine biology and oceanography. For research in these fields the Allan Hancock Foundation building was constructed in 1940, and the Foundation ships, first the *Velero III*, and now the *Velero IV*, have been especially equipped.

Capt. Hancock was Director of the Foundation from its inception until June 1954. On his recommendation Dr. A. S. Raubenheimer, Educational Vice-President of the University was made Director, although Capt. Hancock is still active in an advisory capacity. Research activities were under the direction of Chancellor Rufus B. von KleinSmid until 1947, when a Committee on Research Supervision was set up with the writer as chairman. This continued to function until the appointment in 1950 of the late Dr. James W. Buchanan as Director of Research. After his untimely death in 1952, the committee was reconstituted as simply the Committee on Research, again with the writer as chairman, and with Dr. John S. Garth and Dr. E. Yale Dawson as the other two members.

The research staff consists of five full-time research associates, nine part-time research professors, associates, and scholars, visiting research fellows, associates, and scholars usually not exceeding three in number at any one time, and six graduate fellows. In addition to this group there are three librarians, an executive secretary, and five technicians.

Research activities of the Foundation include the following areas and projects. *Protozoa:* Work on the protozoa was



carried on by Dr. Irene McCulloch until her retirement in July 1952. Since that time she has finished her work on the shallow-water Foraminifera of the Eastern Pacific. Dr. McCulloch's place has been taken by Dr. Orville L. Bandy who is continuing study of the Foraminifera in the Hancock Collections. *Bryozoa:* Dr. Raymond C. Osburn, Professor of Zoology, Emeritus, of Ohio State University, and Research Associate of the Hancock Foundation for many years, retired in 1952. His work on the bryozoa in the Hancock collections is being carried on by his former student and assistant, Dr. John D. Soule. The third and final volume of the monograph on bryozoa of the Eastern Pacific, "Bryozoa of the Pacific Coast of America," (Vol. 14, No. 3, Allan Hancock Pacific Expeditions), has been completed and published. The sections on Cyclostomata, Entoprocta, and the addenda are by Dr. Osburn; the section on Ctenostomata is by Dr. Soule. *Annelida:* Research on the annelid worms under Dr. Olga Hartman has continued with the same vigor that has characterized work in this field since its beginning at the Foundation. Dr. Hartman has published a number of papers and revised the section on annelids for the "Handbook of Biological Data," sponsored by the A.I.B.S., and the chapter on Polychaeta for the forthcoming E. T. Edmondson revision of "Freshwater Biology." The preliminary results of a quantitative survey of the San Pedro Basin, off southern California, were submitted as a communication to the XIV International Congress of Zoology. *Echinodermata:* Research on echinoderms is under the direction of Mr. Fred Ziesenhenne, who is also First Officer of the *Velero IV*. Collecting of specimens has been done on all trips made by the ship, and in addition on several field trips made to Corona Del Mar. These last have been for the purpose of making observations on a Panamic fauna of echinoderms that has become established in that area, but is now threatened with destruction as a result of general beach and housing developments. Miss Ailsa Clark of the British Museum arrived in May 1954 to spend some time at the Foundation studying the Ophiurans. Dr. E. Deichman of the Museum of Comparative Zoology at Harvard University is completing work on a manuscript of the Hancock Holothurians (Part I published). *Mollusca:* With the retirement of Dr. A. D. Howard in 1952, research on molluscs became the concern of Dr. Norman T. Mattox. He has been assisted by two graduate fellows, who have worked at sorting and cataloguing the large amount of molluscan material in the collections, as well as that taken on numerous trips of the *Velero IV*. In December 1953, Mr. T. Soot-Ryen, Director of the Tromso Museum, Norway, came to the Foundation to study some of the pelecypod collections. The work was concluded in June 1954 with the completion of two monographs on eastern Pacific pelecypod families: the Mytilidae and the Arcidae. *Arthropoda:* Research in arthropods has been maintained at a high level by Dr. John S. Garth and his assistants. Both Dr. Garth and former graduate students have published extensively. *Vertebrata:* Research on fishes is being carried on by Miss Janet Haig, who divides her time between this work and assisting Dr. Garth with the arthropods.

Marine Algae: Dr. E. Yale Dawson has been conducting research on marine algae in both the eastern and western Pacific, having spent six months of 1952-53 in the Philippines, Thailand, Okinawa, Japan, Hawaii, and Viet Nam. In the last-named country he worked at the Oceanographic Institute of Nhatrang. A short paper summarizing his activities there has been published in *Science*. The first part of a monograph on marine red algae of Pacific Mexico was published as a Hancock Publication during 1953, and the second part in 1954. In the spring of 1954, Dr. A. A. Aleem, Assoc. Professor of Oceanography of the University of Alexandria, Egypt, came to the Foundation on a Fulbright Grant to work on marine algae. He is working on the algae of Palmyra Island with particular reference to the feeding habits of poisonous reef fishes.

Marine Geology and Sedimentation: Work in marine geology and sedimentation was first started at the Foundation by Dr. Thomas Clements but is now under the direction of Dr. Kenneth O. Emery. That the work is being pursued with vigor is attested by the volume of publications that has originated from Dr. Emery's laboratory in recent years. Dr. Emery spent the summer of 1952 working on the submarine geology of Guam and Japan, and during 1952-54 made 14 trips to local areas. In June 1954 he started a six-weeks survey in the Hawaiian Islands. Intensive investigation is being carried on concerning the time and method of petroleum formation, in cooperation with Dr. S. C. Rittenberg and Dr. Wilson Orr. This project has been financed jointly by the Allan Hancock Foundation and the Geological Society of America.

One of the very important assets of the Hancock Foundation from the point of view of research in marine biology and geology is the marine laboratory ship, *Velero IV*, which is one of the best-equipped oceanographic vessels afloat. Planned cruises are made in connection with long-range research programs but the ship is also available for short-term projects calling for collecting from the sea floor or from the offshore waters.

During the past two years more than fifty trips have been made by the *Velero IV*. Most of the trips were short ones of two or three days, although longer cruises were made beyond the Channel Islands and off Baja California, and one of three-weeks duration to Acapulco. In addition to bottom dredging, samples are taken with core-tube, orange peel sampler, Campbell grab sampler, and snapper. Hauls are also made with the bathypelagic tow net. Shore collecting is done around the islands off the California coast and along the coast of Baja California. During the cruise in Baja California waters, detailed soundings were made in a basin previously inadequately surveyed. This has now been named the Velero Basin.

The library of the Hancock Foundation contains more than 85,000 volumes and 125,000 reprints and pamphlets. The nucleus of this is the foreign serials, American serials, and valuable books of the Boston Museum of Natural History, purchased by Capt. Hancock in 1944 and 1946. It thus has few equals in the fields of marine zoology, botany, and geology.

There can be no more concrete evidence of the scientific activity of an organization than its publications. Those of the Allan Hancock Foundation consist of the *Allan Hancock Pacific Expeditions*, the *Allan Hancock Atlantic Expedition* of 1939, and *Occasional Papers*. The first mentioned now numbers 18 volumes consisting of 88 individual papers; the second is a single volume of six reports, and the *Occasional Papers* number 12. In addition, in the last two years members of the staff published 46 papers in the scientific journals of their respective fields, and their graduate students published another 15. Dr. Irene McCulloch was editor of the Hancock Publications until her retirement in 1952. She was succeeded by Mrs. Dorothy Holmos, Hancock Librarian, who has ably handled both positions since that time. Under the editorship of Mrs. Holmos, Part III of Osburn's volume on the bryozoa, Parts I and II of Dawson's monograph on the marine red algae of Pacific Mexico, a number on flatworms from the Galapagos Islands by Hyman, and one on amphipods by Barnard have been published.

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